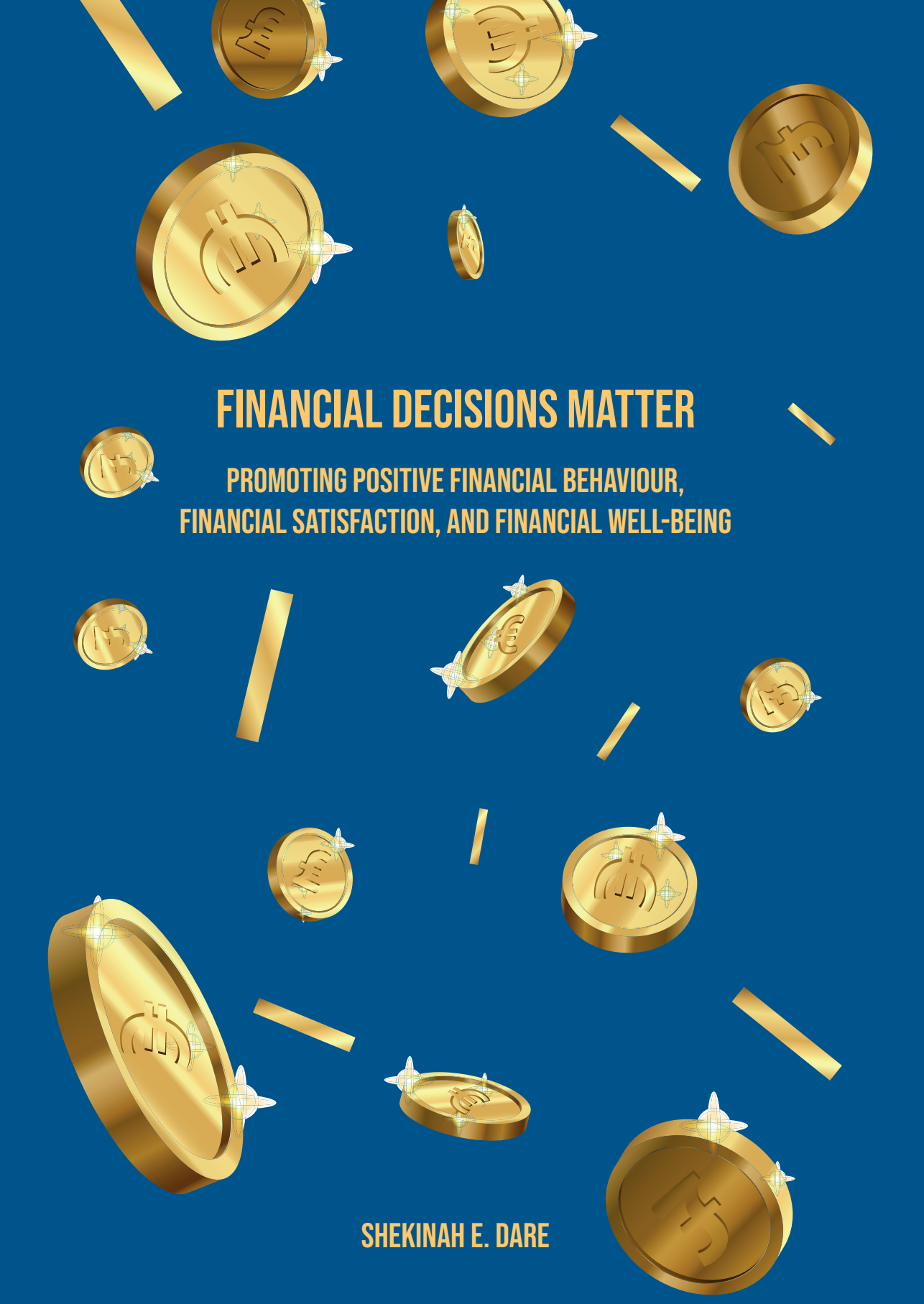

FINANCIAL DECISIONS MATTER

PROMOTING POSITIVE FINANCIAL BEHAVIOUR, FINANCIAL SATISFACTION, AND FINANCIAL WELL-BEING

SHEKINAH E. DARE

Financial Decisions Matter

Promoting Positive Financial Behaviour,
Financial Satisfaction, and Financial Well-Being

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Table of Contents

Chapter 1

Introduction

Sound financial decision-making is essential in modern society, concerning positive financial behaviours, such as paying bills on time, active saving, and working toward financial goals. Whether people want to buy a house, finance an education, invest for wealth accumulation, or save for retirement, they must understand how to manage their money effectively. Today, people face several trends that are challenging their way of living and managing their money. In areas such as housing, education, healthcare, and pensions, people have to conduct their own research to help them make the best financial decisions possible. For example, in the Netherlands, every year people must decide about their own health insurance (Simonse, Van der Werf, & Wilmink, 2017). Likewise, in the United States, people need to choose their own pension plans (Lusardi, 2019). Moreover, financial service providers, such as commercial banks, credit unions, brokerage firms, and insurance companies offer an abundance of financial choices, leading to a choice overload, which, in turn, can result in confusion and difficulty in making financial decisions (Amagir, 2020). People must choose among investment and savings products that are more sophisticated than before, with varying interest rates and maturities. The financial landscape has also become increasingly dynamic because of technological advances (Simonse et al., 2017). Online shopping, for instance, enables people to access ample purchase opportunities, and can cause them to use and overextend credit (Credit Connect, 2020). People increasingly choose and purchase financial products online and use mobile banking apps (Simonse et al., 2017). These recent trends illustrate that people need to take on more financial responsibilities, and the decisions they make today can have a lasting impact on their future, thus putting much pressure on their financial decisions.

Although sound financial decision-making is important, many people are struggling with it. For example, in the United Kingdom, about one in six adults is over-indebted, suggesting that it is difficult for them to keep up with their bills and credit commitments

(MAS, 2018a). Moreover, two in five working age adults have less than £100 in savings (MAS, 2016a). Among the young, one in four adults live with financial problems (MAS, 2016b), and almost three-quarters of them have experienced mental health or well-being problems related to money at some point (MAS, 2018b). Similarly, in the Netherlands, one in three households has payment arrears (Van Dijk, 2016), and about one in five households has problematic debts (i.e., debts that cannot be repaid within three years) or are at great risk of getting into problematic debts (Westhof, De Ruig, & Kerckhaert, 2015). Survey findings reported by the National Institute for Family Finance Information (Nibud, 2017) also showed that one in five households does not have savings and one in three households cannot cover unanticipated expenses. The younger generation in the Netherlands forms no exemption to this pattern, as an increasing number of young people have debts and request professional help (Madern, 2014).

Adverse consequences of poor financial decisions

Poor financial decision-making carries substantial costs. From an individual standpoint, people who do not understand how financial markets work are unable to access banking and financial services and remain outside of these markets (Klapper & Lusardi, 2016). In addition, those who do not understand how interest compounding works might end up spending more on transaction fees, borrowing more, saving less, and incurring more interest rates on loans (Lusardi & De Bassa Scheresberg, 2013; Lusardi & Tufano, 2015; Stango & Zinman, 2009). When debts increase, scarce financial resources take a toll on several aspects of people's lives, such as their mental and physical health (Richardson, Elliott, & Roberts, 2013; Sweet, Nandi, Adam, & McDade, 2013; Van Dijk, Van der Werf, & Van Dillen, 2021). The societal consequences of financial problems are also severe. Studies have shown that more household debt is related to less economic growth, more

unemployment, and a higher likelihood of future banking crises (Jordà, Schularick, & Taylor, 2016; Mian, Sufi, & Verner, 2017). For example, it has been estimated that the financial problems of households in the Netherlands cost the Dutch society about €10 billion per year (Simonse et al., 2017). All the above suggests that sound financial decision-making is imperative, not only for individuals themselves and for their households, but for the society as well.

Benefits of sound financial decisions

Sound financial decisions may increase people's financial satisfaction and financial well-being. To illustrate, people who pay their (credit card) bills on time can freely spend the remaining money on any items they want (Joo & Grable, 2004; Robb & Woodyard, 2016). Likewise, people who set aside money for emergencies or a rainy day create a financial buffer to support both positive life events, such as further education, and (unexpected) negative life events like unemployment or work disability (Joo & Grable, 2004; Robb & Woodyard, 2016; Xiao, Chen, & Chen, 2014). Whereas people who effectively manage their credit know when they can take a loan and for what amount (Robb & Woodyard, 2016). The same goes for people who review their credit report frequently to ensure that they have a good financial reputation (Robb & Woodyard, 2016). These sound financial decisions can help people to lead better (financial) lives and, thereby, increase their financial satisfaction and financial well-being. The difference between financial satisfaction and financial well-being is that the former relates to current financial circumstances only, whereas the latter covers both current and future financial circumstances. Evidence indeed supports a positive relation between sound financial decisions, and both financial satisfaction and financial well-being (CFPB, 2015).

Making sound financial decisions provides people with more financial room to enjoy life, for example, by spending more free time with family and friends, eating healthy and exercising, affording comfortable housing, and taking holidays, which help them to improve their overall quality of life (see e.g., Allen, 2020). Poor financial decisions, on the other hand, may lead to financial problems and negative consequences for mental and physical health, as discussed earlier. By gaining insights into the factors that influence financial decisions, policymakers, educators, practitioners, and service providers, among others, can identify strategies that decrease the adverse consequences of poor financial decisions and/or increase the benefits of sound financial decisions.

The present dissertation

We posit that, to make sound financial decisions, three sets of factors are crucial: (a) objective and subjective financial knowledge, (b) attitude toward money and future orientation, and (c) control skills. Below, we elaborate on these factors.

Objective and subjective financial knowledge

People's financial decision-making should benefit from having sufficient objective and subjective financial knowledge. Objective financial knowledge involves understanding how the financial landscape works, including money, financial concepts, products, services, risks, and opportunities. A lack of said knowledge can put people at risk of financial insecurity (Khan, Rothwell, Cherney, & Sussman, 2017) and poverty (Askar, Ouattara, & Zhang, 2020). Conversely, as widely documented, objective financial knowledge can lead to sound financial decisions, such as to put money aside in an emergency fund, pay bills on time, not overdraw a checking account, not use high-cost borrowing methods, and plan for retirement (Arifin, 2017; De Bassa Scheresberg, 2013; Robb & Woodyard, 2011).

Subjective financial knowledge refers to how people evaluate their own knowledge, which relates to people's confidence in their financial knowledge. Thus, it is not necessarily grounded in people's actual financial knowledge. Notably, research has claimed that subjective financial knowledge is a stronger predictor of sound financial decisions than objective financial knowledge (Allgood & Walstad, 2013; Anderson, Baker, & Robinson, 2017). This may be explained by confident people making more proactive financial decisions to prevent financial issues (see e.g., Atlas, Lu, Micu, & Porto, 2019). And if such issues arise, they may be more prompted to seek for counselling or advice to resolve them rapidly. Nevertheless, people are often unable to assess their knowledge accurately (Courchane & Zorn, 2005), such that they may be over-confident or under-confident about the financial knowledge they possess and, accordingly, about their capacity to engage in positive financial behaviors. Such (in)accurate perceptions of people's financial knowledge can be studied by comparing their objective and subjective knowledge, which has been done in recent studies (e.g., Lind et al., 2020).

Financial education serves as a tool to increase both objective and subjective financial knowledge. In fact, many large countries, including most members of the Organization for Economic Co-operation and Development (OECD), have implemented financial education programs to contribute to broader social matters, such as financial inclusion and financial stability (OECD, 2015). Overall, these programs currently aim at more than five billion people in sixty countries, and an increasing number of countries is committing to this cause (Kaiser, Lusardi, Menkhoff, & Urban, 2020). Previous research has found that adults who have received financial education at an early age were better able to manage their money wisely later in life than those who did not (CYFI, 2013). In line with this finding, the OECD (2005, 2014) has recommended to provide financial education at a young age during formal schooling (i.e., as part of school curricula). Following this recommendation, the Netherlands,

for example, has started to embed financial education in their school program (age 4 to 18). Several organizations like the National Institute for Family Finance Information (Nibud) and the Money Wise platform (Wijzer in geldzaken) have built educational programs to promote sound financial decision-making. In the school year 2016/2017, about 21,000 classes ordered the modules of a large-scale national financial education program, suggesting a reach of about 450,000 pupils in primary school (Simonse, 2017).

Attitude toward money and future orientation

Even when people have both financial knowledge and confidence, they still can make poor financial decisions. After all, these decisions depend also on whether or not people remain up-to-date with changing conditions in their financial environment, especially those resulting from several recent trends, as described earlier. This is where a positive attitude toward money comes in, referring to a positive mindset or view that people have toward their finances, which helps them to see money as an instrument to meet their financial goals and attain financial success (Tracy, 2021). Generally, people with a more positive attitude toward money are more likely to actively seek money-related information to expand their skill set. As a result, they can more readily identify sound financial decisions, such as saving money and paying bills on time. Indeed, prior studies have shown that a positive attitude toward money is related to sound financial decisions, such as budgeting and saving (Hong, 2005; Kim, 2003).

Furthermore, many decisions concern the future, which is often uncertain. It is, therefore, important to know how focused people are on the future. When people take into account the future consequences of their current actions, this can help them to recognize and take sound financial decisions, such as saving and investing money (Metcalf & Zimbardo, 2016; Thorstad & Wolff, 2018). Research suggests that more future-oriented people are more

likely to have savings (Rabinovich & Webley, 2007), participate in savings programs (Howlett, Kees, & Kemp, 2008), and invest in the future (Thorstad & Wolff, 2018). Whereas those who are less future-oriented are more likely to borrow money (Webley & Nyhus, 2001) and have debt (Lea, Webley, & Walker, 1995).

Control skills

Even if people have all aforementioned factors, they can still feel tempted to make financial decisions that are satisfying in the short term, but might be harmful in the long run. Control skills, whether actual or perceived, may protect people against such temptations and subsequent poor financial decision-making. In the following, we address four control skills: spending self-control, perceived behavioural control, executive functions, and financial self-efficacy.

Spending self-control—the ability to monitor and regulate purchase impulses (Haws, Bearden, & Nenkov, 2012)—can help people work toward achieving their financial goals. For example, it can help to avoid buying impulse items that people do not necessarily need (e.g., luxury brand shoes or high fashion clothes), and thereby prevent possible credit overextension. Studies have shown that people with spending self-control are more likely to engage in sound financial decisions, such as paying bills on time, keeping track of expenses, and saving for long-term goals (Barbić, Lučić, & Chen, 2018; Strömbäck et al., 2017).

Likewise, perceived behavioural control (i.e., the degree of control one experiences, to perform a behaviour) can help people to make financial decisions that might benefit their distant financial goals, such as saving money. According to existing evidence, more perceived behavioural control is associated with higher intentions to plan financially for retirement (Zhang & Lee, 2016) and lower credit card bills (Kennedy, 2013).

Executive functions regard mental processes or cognitive abilities or skills that enable people to perform goal-directed behavior (Diamond, 2013). More specifically, these skills help people to stay focused on a task despite internal and external distractions, remember details, deal with multiple tasks, come up with different approaches to solve a problem, and acquire, hold on to, and process flows of information (CFPB, 2020; Drever et al., 2015). Consequently, people with good executive functions could be more likely to prepare and stick to a budget, set financial goals, and choose when to buy or save money—all examples of sound financial decisions. Nevertheless, to date, empirical findings regarding the relation between executive functions and sound financial decisions have been inconclusive. Whereas some researchers found a positive relation (Drever et al., 2015), others showed no significant relation (Strömbäck, Skagerlund, Västfjäll, & Tinghög, 2020).

A fourth and final control skill we address here is financial self-efficacy, which encompasses belief in one's abilities to meet financial goals (e.g., saving for retirement or paying bills on time). It can influence several aspects of people's life, including their goals, choices, determination to accomplish tasks while coping with challenges, and negative or positive patterns of thought (Noor, Batool, & Arshad, 2020). Therefore, people with a high sense of financial self-efficacy may take steps to accomplish their financial goal, for example, by preparing a budget and sticking to it, spending less, and saving more. Prior work has demonstrated that greater financial self-efficacy is related to fewer financial problems, and more savings and investment products, but less debt-related products (Farrell, Fry, & Risse, 2016; Lapp, 2010).

Overview of conducted studies

In line with the aforementioned arguments, we conducted four empirical studies that focus on the relations between, on the one hand, financial knowledge, psychological factors

(i.e., attitude toward money, future orientation, and control skills), and positive financial behaviours, and, on the other hand, financial satisfaction and financial well-being.

In Chapter 2, we tested the effectiveness of two modules (Responsible Spending module and Performing Transactions module) of the national financial education program for primary schools in the Netherlands. This study was carried out from October 2016 to March 2017 and covered 124 randomly selected schools including 2,650 pupils between the ages of 9 and 13 years in the fifth grade. In Chapter 3, we tested the extent to which the four different combinations of high and low objective and subjective financial knowledge and different types of positive financial behaviours contribute to financial well-being. This study involved the OECD Financial Literacy Questionnaire (OECD/INFE, 2018), was completed in April-May 2015, and included 1,080 respondents aged 18 to 79 years. In Chapter 4, we tested the extent to which objective and subjective financial knowledge, future orientation and attitude toward money, and spending self-control and perceived behavioural control predict positive financial behaviours, and, in turn, contribute to financial satisfaction. This study included publicly available data from the Financial Capability Survey (MAS, 2018b) commissioned by the Money Advice Service (MAS), and included 2,133 respondents aged 18 to 64 years who completed the survey online between April and June 2018, and had indicated that they—personally or jointly—managed their household's financial decisions. In Chapter 5, we shifted our focus specifically to control skills, thereby testing the extent to which executive functions and financial self-efficacy predict positive financial behaviours and, in turn, contribute to financial well-being. This study was completed during 10-12 December 2020 through the online platform Prolific (www.prolific.com) and included 411 respondents who lived in the UK, were a native English speaker, and were responsible (personally or jointly) for their households' day-to-day financial decisions. In Chapter 6, we provide a summary of

the four empirical chapters and present an overall conclusion including the key takeaways from the present dissertation.

References

Allen, T. A. (2020, January 25). The importance of learning to make sound financial decisions early in life. *Tyler Allen.* https://tylerallen.com/the-importance-of-learning-to-make-sound-financial-decisions-early-in-life/

Allgood, S., & Walstad, W. B. (2013). How economists allocate time to teaching and research. *American Economic Review, 103*(3), 654–658. https://doi.org/10.1257/aer.103.3.654

Amagir, A. (2020). Financial education in the Netherlands. In K. De Witte, O. Holz, & K. De Beckker (Eds.), *Financial Education: Current Practices and Future Challenges* (pp. 143–170). Waxmann Verlag GmbH. http://eufin.org/docs/Financial-education-in-the-Netherlands.pdf

Anderson, A., Baker, F., & Robinson, D. (2017). Precautionary savings, retirement planning and misperceptions of financial literacy. *Journal of Financial Economics, 126*(2), 383–398. https://doi.org/10.1016/j.jfineco.2017.07.008

Arifin, A. Z. (2017). The influence of financial knowledge, control and income on individual financial behavior. *European Research Studies Journal, 20*(3A), 635–648. https://doi.org/10.35808/ersj/734

Askar, M. W., Ouattara, B., & Zhang, Y. (2020). *Financial literacy and poverty reduction: The case of Indonesia* (ADBI Working Paper No. 1097). Asian Development Bank Institute. https://www.adb.org/publications/financial-literacy-poverty-reduction-case-indonesia

Atlas, S. A., Lu, J., Micu, P. D., & Porto, N. (2019). Financial knowledge, confidence, credit use, and financial satisfaction. *Journal of Financial Counseling and Planning, 30*(2), 175–190. https://doi.org/10.1891/1052-3073.30.2.175

Barbić, D., Lučić, A., & Chen, J. M. (2018). Measuring responsible financial consumption behaviour. *International Journal of Consumer Studies, 43*(1), 102–112. https://doi.org/10.1111/ijcs.12489

CFPB (Consumer Financial Protection Bureau). (2015). *Financial well-being: The goal of financial education* (Report). Consumer Financial Protection Bureau. https://files.consumerfinance.gov/f/201501_cfpb_report_financial-well-being.pdf

CFPB (Consumer Financial Protection Bureau). (2020). *Executive function* (Report). Consumer Financial Protection Bureau. https://www.consumerfinance.gov/consumer-tools/educator-tools/youth-financial-education/learn/executive-function/

Courchane, M. & Zorn, P. (2005, June 1). *Consumer literacy and credit worthiness* [Paper presentation]. Wisconsin Department of Financial Institutions, Task Force on Financial Literacy, Wisconsin, United States. https://www.researchgate.net/profile/Marsha_Courchane/publication/5042561_Consumer_literacy_and_creditworthiness/links/547dfd7f0cf241bf4b5b9c1b.pdf

Credit Connect. (2020, December 9). Online shopping debt on the rise. *Credit Connect.* https://www.credit-connect.co.uk/consumer-news/online-shopping-debt-on-the-rise/

CYFI (Child and Youth Finance International). (2013). *Children, youth, and finance: From momentum to action* (Report No. 1). Child and Youth Finance International. http://childfinanceinternational.org/resources/publications/children-youth-finance-from-momentum-to-action.pdf

De Bassa Scheresberg, C. (2013). Financial literacy and financial behavior among young adults: Evidence and implications. *Numeracy, 6*(2), 1–21. https://dx.doi.org/10.5038/1936-4660.6.2.5

Diamond, A. (2013). Executive functions. *Annual Review of Psychology, 64*, 135–168. http://dx.doi.org/10.1146/annurev-psych-113011-143750

Drever, A. I., Odders-White, E., Kalish, C. W., Else-Quest, N. M., Hoagland, E. M., and Nelms, E. N. (2015). Foundations of financial well-being: Insights into the role of executive function, financial socialization, and experience-based learning in childhood and youth. *Journal of Consumer Affairs, 49*, 13–38. https://doi.org/10.1111/joca.12068

Farrell, L., Fry, T. R. L., & Risse, L. (2016). The significance of financial self-efficacy in explaining women's personal finance behaviour. *Journal of Economic Psychology, 54*, 85–99. https://doi.org/10.1016/j.joep.2015.07.001

Haws, K. L., Bearden, W. O., & Nenkov, G. Y. (2012). Consumer spending self-control effectiveness and outcome elaboration prompts. *Journal of the Academy of Marketing Science, 40*(5), 695–710. https://doi.org.10.1007/s11747-011-0249-2

Hong, E. (2005). A study on the money attitudes and the spending behaviors of middle, high, and college students. *Journal of the Korean Home Management Association, 23*(5), 103–121.

Howlett, E., Kees, J., & Kemp, E. (2008). The role of self-regulation, future orientation, and financial knowledge in long-term financial decisions. *Journal of Consumer Affairs, 42*(2), 223–242. https:///doi.org/10.1111/j.1745-6606.2008.00106.x

Joo, S., & Grable, J. E. (2004). An exploratory framework of the determinants of financial satisfaction. *Journal of Family and Economic Issues, 25*(1), 25–50. https://doi.org/10.1023/B:JEEI.0000016722.37994.9f

Jordà, Ò., Schularick, M., & Taylor, A. M. (2016). The great mortgaging: Housing finance, crises and business cycles. *Economic Policy, 31*(85), 107–152. https://doi.org/10.3386/w20501

Kaiser, T., Lusardi, A., Menkhoff, L., & Urban, C. J. (2020). *Financial education affects financial knowledge and downstream behaviors* (NBER Working Paper No. 27057). National Bureau of Economic Research. https://www.nber.org/papers/w27057

Khan, M. N., Rothwell, D. W., Cherney, K., & Sussman, T. (2017). Understanding the financial knowledge gap: A new dimension of inequality in later life. *Journal of Gerontological Social Work, 60*(7), 1–17. https://doi.org/10.1080/01634372.2017.1317311

Kim, K. (2003). Money attitudes and personal finance of college students. *Journal of Consumption Culture, 6*(3), 33–50.

Klapper, L., & Lusardi, A. (2016). Financial literacy and financial resilience: Evidence from around the world. *Financial Management, 49*(3), 589–614. https://doi.org/10.1111/fima.12283

Kennedy, B. P. (2013). *The theory of planned behavior and financial literacy: A predictive model for credit card debt?* [Doctoral dissertation, Marshall University]. Marshall Digital Scholar. http://mds.marshall.edu/cgi/viewcontent.cgi?article=1480&context=etd

Lapp, W. M. (2010). *Behavior models for prosperity: A statistical assessment of savings and behavioral change* (EARN Research Brief). Earned Assets Resource Network. https://www.earn.org/wp-content/uploads/2015/03/5_-_Behavioral_Models_for_Prosperity-_A_Statistical_Assessment_of_Savings_and_Behavioral_Change-1.pdf

Lea, S., Webley, P., & Walker, E (1995). Psychological factors in consumer debt: Money management, economic socialization, and credit use. *Journal of Economic Psychology, 16*, 681–701. https://doi.org/10.1016/0167-4870(95)00013-4

Lind, T., Ahmed, A., Skagerlund, K., Strömbäck, C., Västfjäll, D., & Tinghög, G. (2020). Competence, confidence, and gender: The role of objective and subjective financial knowledge in household finance. *Journal of Family and Economic Issues, 41*(2), 626–638. https://doi.org/10.1007/s10834-020-09678-9

Lusardi, A. (2019). Financial literacy and the need for financial education: Evidence and implications. *Swiss Journal of Economics and Statistics, 155*(1), 1–8. https://doi.org/10.1186/s41937-019-0027-5

Lusardi, A., & De Bassa Scheresberg, C. (2013). *Financial literacy and high-cost borrowing in the United States* (NBER Working Paper No. 18969). National Bureau of Economic Research. https://ideas.repec.org/p/nbr/nberwo/18969.html

Lusardi, A., & Tufano, P. (2015). Debt literacy, financial experiences, and overindebtedness. *Journal of Pension Economics and Finance, 14*(4), 332–368. https://doi.org/10.1017/S1474747215000232

Madern, T. (2014). *Overkoepelende blik op de omvang en preventie van schulden in Nederland* [Overarching look at the size and prevention of debts in the Netherlands]. (Report). Nationaal Instituut voor Budgetvoorlichting [National Institute for Family Finance Information]. https://www.nibud.nl/beroepsmatig/overkoepelende-blik-op-de-omvang-en-preventie-van-schulden-nederland-2014/#:~:text=De%20samenleving%20kan%20miljoenen%20besparen,van%20zijn%2035%2Djarig%20bestaan

MAS (The Money Advice Service). (2016a). *Low savings levels put millions at financial risk* [Press Release]. https://www.moneyadviceservice.org.uk/en/corporate/press-release-low-savings-levels-put-millions-at-financial-risk#:~:text=The%20research%2C%20launched%20today%20by,to%20them%20at%20any%20time.

MAS (The Money Advice Service). (2016b). *One in six adults struggling with debt worries* [Press Release]. https://www.moneyadviceservice.org.uk/en/corporate/one-in-six-adults-struggling-with-debt-worries

MAS (The Money Advice Service). (2018a). *Levels of over-indebtedness in the UK* (Document). The Money Advice Service. https://www.moneyadviceservice.org.uk/en/corporate/a-picture-of-over-indebtedness-in-the-uk

MAS (The Money Advice Service). (2018b). *Money worries have left two in three Brits worried about loved one's mental health* [Press Release]. https://www.moneyadviceservice.org.uk/en/corporate/press-release--money-worries-have-left-two-in-three-brits-worried-about-loved-ones-mental-health

Metcalf, B. R., & Zimbardo, P. (2016). Time perspective theory. In H. L. Miller (Ed.), *Encyclopedia of theory in psychology* (pp. 937–939). Sage. https://doi.org/10.4135/9781483346274.n320

Mian, A., Sufi, A., & Verner, E. (2017). Household debt and business cycles worldwide. *The Quarterly Journal of Economics, 132*(4), 1755–1817. https://doi.org/10.1093/qje/qjx017

National Institute for Family Finance Information (Nibud). (2017). *Geld achter de hand makkelijker maken: Nibud-visiedocument over het stimuleren van sparen* [Making financial buffers easier: Nibud vision document on stimulating savings]. (Report). Nationaal Instituut voor Budgetvoorlichting [National Institute for Family Finance Information]. https://www.nibud.nl/beroepsmatig/geld-hand-makkelijker-maken-2017/

Noor, N., Batool, I., & Arshad, H. M. (2020). Financial literacy, financial self-efficacy and financial account ownership behavior in Pakistan. *Cogent Economics & Finance, 8*(1), 1–17. https://doi.org/10.1080/23322039.2020.1806479

OECD (Organization for Economic Co-operation and Development). (2005). *Recommendation on principles and good practices for financial education and awareness* (Report). Organization for Economic Co-operation and Development. http://www.oecd.org/finance/financial-education/35108560.pdf

OECD (Organization for Economic Co-operation and Development). (2014). *PISA 2012 results: Students and money: Financial literacy skills for the 21st century.* (Report). Organization for Economic Co-operation and Development. https://www.oecd-ilibrary.org/education/pisa-2012-results-students-and-money-volume-vi_9789264208094-en

OECD (Organization for Economic Co-operation and Development). (2015). *National strategies for financial education* (Policy Handbook). Organization for Economic Co-operation and Development. https://www.oecd.org/finance/National-Strategies-Financial-Education-Policy-Handbook.pdf.

OECD/INFE (Organization for Economic Co-operation and Development/International Network on Financial Education). (2018). *Toolkit for measuring financial literacy and financial inclusion* (Report). Organization for Economic Co-operation and Development. https://www.oecd.org/financial/education/2018-INFE-FinLit-Measurement-Toolkit.pdf

Rabinovich, A., & Webley, P. (2007). Filling the gap between planning and doing: Psychological factors involved in the successful implementation of saving intention. *Journal of Economic Psychology, 28*(4), 444–461. https://10.1016/j.joep.2006.09.002

Richardson, T., Elliott, P., & Roberts, R. (2013). The relationship between personal unsecured debt and mental and physical health: A systematic review and meta-analysis. *Clinical Psychology Review, 33*(8), 1148–1162. https://doi.org/10.1016/j.cpr.2013.08.009

Robb, C. A., & Woodyard, A. S. (2011). Financial knowledge and best practice behavior. *Journal of Financial Counseling and Planning, 22*(1), 60–70.

Robb, C. A., & Woodyard, A. S. (2016). Consideration of financial satisfaction: What consumers know, feel and do from a financial perspective. *Journal of Financial Therapy, 7*(2), 41–61. https://doi.org/10.4148/1944-9771.1102

Simonse, O. (2017). *Do education materials contribute to the financial capability of primary school students? Effectiveness study of financial education for the seventh grade* (Report). Wijzer in geldzaken [Money Wise platform]. https://www.wijzeringeldzaken.nl/platform-wijzeringeldzaken/publicaties/Contribution_of_education_materials_to_financial_capability_primary_school_students.pdf

Simonse, O., Van der Werf, M., & Wilmink, G. (2017). *Effective ways to advance responsible financial behaviour* (Report). Wijzer in geldzaken [Money Wise platform]. https://www.wijzeringeldzaken.nl/platform-wijzeringeldzaken/publicaties/Effective_ways_to_advance_responsible_financial_behaviour.pdf

Stango, V., & Zinman, J. (2009). Exponential growth bias and household finance. *Journal of Finance, 64*(6), 2807–2849. https://doi.org/10.2139/ssrn.1081633

Strömbäck, C., Lind, T., Skagerlund, K., Västfjäll, D., & Tinghög, G. (2017). Does self-control predict financial behavior and financial well-being? *Journal of Behavioral and Experimental Finance, 14*, 30–38. https://doi.org/10.1016/j.jbef.2017.04.002

Strömbäck, C., Skagerlund, K., Västfjäll, D., & Tinghög, G. (2020). Subjective self-control but not objective measures of executive functions predicts financial behavior and well-being. *Journal of Behavioral and Experimental Finance, 27*, 1–19. https://doi.org/10.1016/j.jbef.2020.100339

Sweet, E., Nandi, A., Adam, E., & McDade, T. (2013). The high price of debt: Household financial debt and its impact on mental and physical health. *Social Science & Medicine, 91*, 94–100. https://doi.org/10.1016/j.socscimed.2013.05.009

Thorstad, R., & Wolff, P. (2018). A big data analysis of the relationship between future thinking and decision-making. *PNAS Proceedings of the National Academy of Sciences of the United States of America, 115*(8), E1740–1748. https://doi.org/10.1073/pnas.1706589115

Tracy, B. (2021). How to develop a positive money mindset. *Brian Tracy International*. https://www.briantracy.com/blog/financial-success/how-to-develop-a-positive-money-mindset/

Van Dijk, W. W. (2016). *Grip op mentaal budget* [Grip on mental budget] (Inaugural Lecture). Leiden University. https://scholarlypublications.universiteitleiden.nl/handle/1887/51669

Van Dijk, W. W., Van der Werf, M., & Van Dillen, L. F. (2021). *The Psychological Inventory of Financial Scarcity (PIFS): A psychometric evaluation*. Manuscript submitted for publication.

Webley, P., & Nyhus, E. K. (2001). Life-cycle and dispositional routes into problem debt. *British Journal of Psychology, 92*(3), 423–446. https://10.1348/000712601162275

Westhof, F., De Ruig, L., & Kerckhaert, A. (2015). *Huishoudens in de rode cijfers 2015: Over schulden van Nederlandse huishoudens en preventiemogelijkheden* [Housholds in red numbers 2015: About debts of Dutch households and possible prevention methods] (Report). Panteia. https://www.financieelgezondewerknemers.nl/bibliotheek/Rapporten/huishoudens-in-de-rode-cijfers-2015.pdf

Xiao, J. J., Chen, C., & Chen, F. (2014). Consumer financial capability and financial satisfaction. *Social Indicators Research, 118*(1), 415–432. https://doi.org/10.1007/s11205-013-0414-8

Zhang, M. J., & Lee, S. S. (2016). A study on behavioral intention for financial retirement preparation to apply theory of planned behavior: Focusing on consumers in their 20s and 30s. *Journal of Korean Home Management Association, 34*(5), 53–68. https://doi.org/10.7466/JKHMA.2016.34.5.53

Chapter 2

The effect of financial education on pupils' financial knowledge and skills: Evidence from a Solomon four-group design

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Financial knowledge and skills are crucial elements for consumers to effectively participate in today's social and economic life. The financial environment, including its digitalization, has become much more difficult and unpredictable, placing certain consumers at risk of (considerable) financial problems. The societal consequences are severe. In the Netherlands, for example, the number of households with financial problems costs Dutch society an estimated €10 billion per year (Madern, 2014).

There is therefore growing interest in measures and interventions to increase financial knowledge and skills, preferably at an early age. A promising path is to provide early education to children to improve their ability to make effective financial decisions later on in adulthood. Research has indicated that adults who received financial education at a young age are more capable of managing their financial resources than those who did not (CYFI, 2013). Studies moreover found that it is feasible to teach primary school children about finances because they can understand basic matters in the financial and economic field (Batty, Collins, & Odders-White, 2015; Kobliner, 2017; Otto, Schots, Westerman, & Webley, 2006; Webley, 2005). Together, these findings underscore the importance and feasibility of financial education at an early age to equip children with the necessary knowledge and skills to make responsible and effective financial decisions later in life (CYFI, 2013; OECD, 2005).

As parents, caregivers, or guardians are not always able (e.g., due to lack of knowledge, skills, time, or motivation) to teach their children about financial matters, the Organization for Economic Co-operation and Development (OECD, 2005) recommends that financial education be built into school curricula during children's compulsory schooling. Several countries, including the Netherlands, have followed this recommendation and started to include financial education in their school program. The benefits of financial education are apparent at both the individual and collective level. At the individual level, financial education helps consumers to become financially capable and make sound financial decisions

for themselves and their families (Mundy, 2011; Sledge, Tescher, & Gordon, 2010; Xiao & O'Neill, 2016). This is essential because failing to make sound financial decisions can lead to excessive debts. When debts increase, scarce monetary resources can profoundly impact consumers' ability to manage other aspects of their lives, such as finding a job, buying a house, and planning for the future (Lane, 2016; Mullainathan & Shafir, 2013; Social Science and Parliamentary Affairs Team, 2010). Moreover, excessive debts can result in severe stress, poor physical and mental health, and even domestic violence and suicide (Chapman & Freak, 2013; Drentea, 2000; Lane, 2016). Financial education may also contribute to higher average earnings, increased labor productivity, and lower likelihood of social problems (Hanushek & Kimko, 2000; Krueger & Lindahl, 2001). At the collective level, financial education contributes to financial stability and economic growth and, if accessible to all members of society, it can moreover promote socio-economic equality (Green & Preston, 2001; Lusardi & Mitchell, 2014).

The effect of financial education on financial knowledge and skills

Financial education can be defined as:

> the process by which financial consumers/investors improve their understanding of financial products, concepts and risks and, through information, instruction and/or objective advice, develop the skills and confidence to become more aware of financial risks and opportunities, to make informed choices, to know where to go for help, and to take other effective actions to improve their financial well-being (OECD, 2005, p. 4).

By providing financial education in the learning-teaching trajectory at schools or through courses, workshops, or e-learning, children can gain at least a basic level of financial knowledge and skills.

The need for financial education has been widely recognized. Nonetheless, little is known yet about what makes financial education programs effective and what financial competencies these programs can improve. Previous research regarding the effect of financial education programs on financial knowledge, skills, attitude, and behavior has been inconclusive because these programs were diverse in their duration, timing, content, design, and target group (Atkinson, Messy, Rabinovich, & Yoong, 2015; Bruhn, Leão, Legovini, Marchetti, & Zia, 2013; Fernandes, Lynch, & Netemeyer, 2014; Kaiser & Menkhoff, 2017; Miller, Reichelstein, Salas, & Zia, 2014; O'Prey & Shephard, 2014; OECD, 2013). Specifically for primary school pupils, it was reported that financial education has a positive effect on financial knowledge, skills, attitude, and behavior (Batty et al., 2015; Kalwij et al., 2019; Sherraden, Johnson, Guo, & Elliott, 2011).

A Dutch national financial education program

The Dutch Ministry of Finance together with the educational publisher Zwijsen developed a large-scale national financial education program for Dutch primary schools with the aim to make children financially self-empowered.[1] This program consisted of four modules for the first and second graders and five modules for the third, fourth, and fifth graders. The modules were based on the financial competencies as defined by the National Institute for Family Finance Information of the Netherlands (2013), and formed a continuous learning line in primary schools, linked to specific behavioral objectives.[2] The modules also applied activity-based learning techniques[3], thereby enabling pupils to experience real-life examples to immediately apply what they learned in practice. Moreover, the modules were

[1]A financially self-empowered consumer can be defined as someone who "makes well-considered choices in such a way that his or her finances are balanced, both in the short and long term" (Nationaal Instituut voor Budgetvoorlichting [National Institute for Family Finance Information], 2013, p. 10). See Simonse (2017), for further details on the financial education program.
[2]See Wijzer in geldzaken [Money Wise platform] (2019), for details on all modules.
[3]See, for example, Festus (2013) and Lippman (2016), for further details on activity-based learning.

consistent with the cognitive, social, and psychological development stage of the pupils. Overall, the modules aimed at developing pupils' knowledge and skills. In the school year 2016/2017, about 21,000 classes ordered the modules, suggesting a reach of approximately 450,000 pupils in primary school (Simonse, 2017). With potentially many children participating in the program, it becomes even more important to investigate whether or not the modules are effective and to understand the reasons for their (in)effectiveness, which forms the central aim of the present study.

The present study

The present study reports the effectiveness of two of the modules of the financial education program discussed above.

Our contribution to the financial education literature is threefold. First, we provide valuable insights on what approach may work for primary school children. Proper assessment of the modules' effectiveness is important because the obtained insights can be used to adapt the current financial education program, if and where necessary, and to design new financial education programs for this target group. Second, it was important to collect information about the program in a methodologically correct way. To do so, we applied a Solomon four-group design because it allows us to distinguish between the effects caused by repeated testing (the pretest sensitization or the pretest effect; Chua, 2012) and the intervention effects. Earlier research often failed to implement this design, thereby resulting in a possible misinterpretation of the findings as it is difficult to determine whether the found effects stemmed from multiple measurement or from the intervention itself (e.g., Batty et al., 2015; Kalwij et al., 2019). Third, it was crucial to use a statistical analytic tool to investigate the program's effectiveness in an accurate manner. We used mixed model analyses as these allow for the modeling of multi-levels within the dataset and are asymptotically efficient with

minimum variance despite missing data points. Previous research has typically not applied this tool, thus making it difficult to consider both fixed and random effects[4] (e.g., Huck & Sandler, 1973; Yu, 2018).

Materials and methods

Participant recruitment and intervention

The present study used the Solomon four-group quasi-experimental[5] design (Solomon, 1949). The groups were defined based on whether or not pupils participated in the intervention, intervention group vs. control group and on the number of assessments the pupils took, 3-measures group vs. 2-measures group (see Table 1).

Table 1. *The Solomon four-group quasi-experimental design*

Time (column) / Group (row)	Pre-Assessment	Intervention Module Responsible Spending	Post-Assessment 1	Intervention Module Performing Transactions	Post-Assessment 2
3-measures Intervention	Yes	Yes	Yes	Yes	Yes
3-measures Control	Yes	No	Yes	No	Yes
2-measures Intervention	No	Yes	Yes	Yes	Yes
2-measures Control	No	No	Yes	No	Yes

The 3-measures group was assessed before and after each module was completed in the intervention group. Thus, the analytic design was a 2 Intervention (Intervention vs. Control) × 3 Time (Pre-Assessment vs. Post-Assessment 1 vs. Post-Assessment 2) factorial design. The 2-measures group was assessed after each module was completed in the intervention group. Hence, the analytic design was a 2 Intervention (Intervention vs. Control) × 2 Time (Post-Assessment 1 vs. Post-Assessment 2) factorial design.

[4]Fixed effects remain constant across pupils and schools, while random effects vary across pupils and schools.
[5]Our study had a quasi-experimental design because the schools in the intervention groups were already using the financial education program, while the schools in the control groups were not using the financial education program yet.

Due to the difference in the analytic designs of the two groups, separate analyses were conducted. For all pupils included in our sample, parental permission was obtained. Pupils participated in Pre-Assessment in October 2016 to assess their start level of knowledge and skills. Post-Assessment 1 was taken in December 2016, after the intervention groups completed the Responsible Spending module. Post-Assessment 2 was taken in March 2017, after the intervention groups completed the Performing Transactions module.

The present study comprised 124 randomly selected primary schools in the Netherlands. The sample included 1,390 pupils at 64 schools in Pre-Assessment, 2,424 pupils at 120 schools in Post-Assessment 1, and 2,171 pupils at 114 schools in Post-Assessment 2. The pupils were between the ages of 9 and 13 years ($M_{age} = 10.38$ years, $SD = 0.68$), all of whom were in the fifth grade of primary school.[6] The group of pupils in each assessment occasion was comparable in socioeconomic status scores. The sample characteristics are depicted in Tables 2A and 2B.

[6]We collected data from pupils in the fifth grade for two reasons. First, they were relatively older and therefore money played a more concrete role in their lives. Second, it was not possible to use data from pupils in the sixth grade due to their busy school schedule (school camp, musical, and final exam) and, as a result, insufficient time to conduct the research.

Table 2A. *Sample characteristics*

	Pre-Assessment *N* (%)	Post-Assessment 1 *N* (%)	Post-Assessment 2 *N* (%)
Gender			
Girl	713 (51.3%)	1,231 (50.8%)	1,097 (50.5%)
Boy	677 (48.7%)	1,193 (49.2%)	1,074 (49.5%)
Spoken language			
Dutch	1,170 (84.2%)	2,110 (87.0%)	1,877 (86.5%)
Other	220 (15.8%)	314 (13.0%)	294 (13.5%)
Pocket money			
Yes	1,115 (80.2%)	1,889 (77.9%)	1,698 (78.2%)
No	275 (19.8%)	535 (22.1%)	473 (21.8%)
Money from doing chores			
Yes	867 (62.4%)	1,544 (63.7%)	1,444 (66.5%)
No	523 (37.6%)	880 (36.3%)	727 (33.5%)
Talking about money at home			
Yes	1,095 (78.8%)	1,937 (79.9%)	1,802 (83.0%)
No	295 (21.2%)	487 (20.1%)	369 (17.0%)
Talking about money in class			
Yes	792 (57.0%)	1,714 (70.7%)	1,788 (82.4%)
No	598 (43.0%)	710 (29.3%)	383 (17.6%)

All primary schools in the Netherlands were classified according to their four-digit postal code (without the two uppercase letters). Each postal code area (with approximately 4,000 citizens) was linked to an area-level socioeconomic status score[7] from the Sociaal en Cultureel Planbureau [The Netherlands Institute for Social Research] (2018) according to its inhabitants' income level, education level, and occupation. The primary schools were then grouped into low, medium, and high socioeconomic status scores (see Table 2B). In each of the three socioeconomic status groups, the Education Research Department of the Executive Agency (Dienst Uitvoering Onderwijs or DUO)[8] of the Dutch Ministry of Education, Culture, and Science recruited fifth grade teachers through a simple random sample selection procedure. These teachers were then asked whether or not they used the financial education program. Based on their responses, the schools were divided into two groups. The schools

[7]The socioeconomic status score used was for 2014 because this indicator is derived every four years by the Netherlands Institute for Social Research.
[8]DUO Education Research specializes in research for schools in primary and secondary education and secondary vocational education.

that used the program served as the intervention group and the schools that did not use the program served as the control group.

Table 2B. *Sample characteristics*

	Pre-Assessment *M* (*SD*)	Post-Assessment 1 *M* (*SD*)	Post-Assessment 2 *M* (*SD*)
Socioeconomic status			
Low	-0.06 (0.24)	-0.12 (0.43)	-0.12 (0.44)
Medium	0.46 (0.17)	0.50 (0.16)	0.48 (0.18)
High	1.45 (0.50)	1.43 (0.47)	1.45 (0.48)

Pupils in the intervention group participated in two modules of the financial education program. The Responsible Spending module[9] is taught in December and includes topics such as making choices with a limited budget, the effects of peer pressure and advertising, and estimating the prices of products (see Appendix A, for all learning objectives). The Performing Transactions module[10] is taught in March and helps children to get acquainted with cash and digital money, develop a proactive attitude toward money matters, and investigate the security features of money (see Appendix B, for all learning objectives). It was not possible to counterbalance our research design because these modules are taught according to a relatively fixed learning-teaching trajectory of the schools that participate in the program.

Pupils completed a test regarding their financial competencies of responsible spending and performing transactions effectively in each assessment occasion (see Appendix C). The teachers were instructed not to provide answers and not to discuss the test with the pupils over the course of the study. The validity of the test was studied in the development stage by specialists in the field of financial education, namely the Ministry of Finance of the Netherlands, the educational publisher Zwijsen, and research staff at Leiden University.

[9]In the financial education program, this module is labeled 'Holidays'.
[10]In the financial education program, this module is labeled 'World of Money'.

Assessed variables

Responsible spending. We calculated pupils' scores on five questions with regard to responsible spending (multiple choice questions as shown in Appendix D). These questions measured pupils' knowledge of commercials and the distinction between name brands and counterfeiting brands, as well as their skills level of recognizing prices related to name brands compared to counterfeiting brands, managing money, and signaling the choices of their peers. For each correct answer, pupils were assigned one point and therefore their knowledge and skills scores in responsible spending could range from zero to five. A higher score indicated more knowledge and skills in responsible spending.

Performing transactions effectively. We calculated pupils' scores on six questions with regard to performing transactions effectively (multiple choice questions as shown in Appendix E). These questions measured pupils' knowledge of (paying with) a debit card and a checking account, as well as their skills of understanding the consequences of inserting an incorrect pin code and recognizing whether or not a banknote is authentic. For each correct answer, pupils were assigned one point and therefore their knowledge and skills scores in performing transactions effectively could range from zero to six. A higher score indicated more knowledge and skills in performing transactions effectively.

Control variables

Spoken language. Pupils were asked to indicate (yes or no) whether or not they always spoke Dutch at home. This variable was dummy coded 1 for pupils who always spoke Dutch at home and 0 for the other pupils.

Talking about money at home. Pupils were asked to indicate (yes or no) whether or not they talked about money at home (e.g., about pocket money, what you can buy, and who

pays for what).[11] This variable was dummy coded 1 for pupils who talked about money at home and 0 for the other pupils.

Talking about money in class. Pupils were asked to indicate (yes or no) whether or not they talked about money in class (e.g., about pocket money, commercials, or how you can manage money in a safe manner).[12] This variable was dummy coded 1 for pupils who talked about money in class and 0 for the other pupils.

Pocket money. Pupils were asked to indicate (yes or no) whether or not they received pocket money. This variable was dummy coded 1 for pupils who received pocket money and 0 for the other pupils.

Money from doing chores. Pupils were asked to indicate (yes or no) whether or not they earned money from doing chores. This variable was dummy coded 1 for pupils who earned money from doing chores and 0 for the other pupils.

Peer pressure. Pupils rated on a three-point scale (0 = often, 1 = sometimes, or 2 = never), to what extent they were sensitive to peer pressure caused by (1) commercials, (2) friends, (3) the desire to be the first, (4) the desire to copy celebrities, and (5) the fear of not belonging to a group. Pupils' responses were reverse scored and then averaged so that their scores could range from zero to two. A higher mean indicated more peer pressure.

Gender. Pupils could indicate their gender by circling the appropriate picture (girl or boy). This variable was dummy coded 1 for girls and 0 for boys.

Age. Pupils could indicate their age by filling in their age in years. This variable was continuous.

Pupil. This was an individual-level variable identifying each pupil.

[11]If pupils answered 'yes', they were asked to what extent they talked about money at home. They could check one of the following boxes: (1) almost every day, (2) once a week, (3) every other week, (4) once a month, and (5) it differs.
[12]If pupils answered 'yes', they were asked to what extent they talked about money at home. They could check one of the following boxes: (1) almost every day, (2) once a week, (3) every other week, (4) once a month, and (5) it differs.

School. This was a cluster-level variable identifying the primary school to which a pupil belonged.

Data analysis

Missing data. Little's (1988) test yielded a statistically significant result, $\chi^2 = 1{,}395.22$, $df = 358$, $p < .001$, suggesting that our data were not missing completely at random. Rather, our data seemed to be either missing at random or missing not at random. To handle the missing values, we used two techniques. The first technique was multiple imputations, which uses maximum likelihood to generate five plausible values for the missing values to capture the correct values (Graham & Hofer, 2000; Rubin, 1987).[13] These five plausible values were averaged and integrated into a single dataset for our analyses. The second technique was the expectation-maximization algorithm, which maximizes the expectation of the log-likelihood function of the missing values, given the available values in the dataset (Borman, 2006; Dempster, Laird, & Rubin, 1977; Haugh, 2015). Although multiple imputations and expectation-maximization algorithm assume that the data are missing at random, both techniques are often unbiased for missing not at random data (e.g., Schafer & Graham, 2002).

In the present study, we report the results based on expectation-maximization algorithm. If results based on multiple imputations differ, we indicate this in a footnote. Results were practically equivalent for both techniques, thereby indicating that the missing values did not affect the accuracy and efficiency of our estimates.

Mixed model analysis. All analyses were performed with the GAMLj module of jamovi statistical platform (Selker, Love, & Dropmann, 2019; The jamovi project, 2019). To assess the intervention effects, mixed model analyses were used. All mixed models were built

[13] See Kang (2013), for an overview of the benefits of multiple imputations.

with pupils and schools as the cluster variables, and time and group as the factors. The effects of time, group, and their interaction were estimated as fixed effects. Furthermore, random intercepts across pupils, random intercepts across schools, and random slopes of time across schools were included. The random component was chosen in preliminary analyses based on maximal random component approach and after pruning out random coefficients whose variance or covariances prevented convergence of the model estimation (Barr, Levy, Scheepers, & Tily, 2013). For each model, a second estimation was carried out with spoken language, talking about money at home, talking about money in class, pocket money, money from doing chores, peer pressure, gender, and age as the covariates. Backward elimination of non-significant (at alpha 0.05) covariates was operated to simplify the results.

For both responsible spending and performing transactions, the 3-measures group and the 2-measures group were analyzed separately. First, the 3-measures group was analyzed comparing the intervention group with the control group in their knowledge and skills over time (i.e., Pre-Assessment vs. Post-Assessment 1 vs. Post-Assessment 2). The intervention effect was evaluated based on the statistical significance and the direction of the Intervention × Time interaction and by evaluating the mean differences between groups before and after the module, using simple effects analysis. Second, the analyses were replicated in the 2-measures group (i.e., Post-Assessment 1 vs. Post-Assessment 2). Third, if intervention effects were found, we used simple effects analysis to explore whether these effects were robust to the way children dealt with money (i.e., spoken language, pocket money, money from doing chores, talking about money at home, and talking about money in class).

Results

The following results report on the effectiveness of the two modules of the Dutch Financial Education Program. The first section reports on the descriptive statistics of the continuous variables used. The second section reports on the intervention effect for the Responsible Spending module when comparing the intervention group to the control group over three assessment occasions (Pre-Assessment, Post-Assessment 1, and Post-Assessment 2). This is the 3-measures group. The third section reports on the intervention effect for the Responsible Spending module when comparing the intervention group to the control group over two assessment occasions (Post-Assessment 1 and Post-Assessment 2). This is the 2-measures group. The fourth section reports on the intervention effect for the Performing Transactions module when comparing the intervention group to the control group over three assessment occasions as described above. The fifth section reports on the intervention effect for the Performing Transactions module when comparing the intervention group to the control group over two assessment occasions as described above.

Descriptive statistics

Table 3 reports the average knowledge and skills scores in responsible spending and performing transactions effectively, and the average peer pressure scores for the 3-measures group and the 2-measures group. For all three variables, scores for both groups were very similar.

Table 3. *Means and standard deviations of the continuous variables*

	3-measures group *M* (*SD*)	2-measures group *M* (*SD*)
Knowledge and skills in responsible spending	4.15 (0.86)	4.13 (0.85)
Knowledge and skills in performing transactions effectively	2.72 (1.24)	2.79 (1.25)
Peer pressure	0.44 (0.31)	0.45 (0.32)

3-Measures group for the knowledge and skills in responsible spending

A 2 Intervention (Intervention vs. Control) × 3 Time (Pre-Assessment vs. Post-Assessment 1 vs. Post-Assessment 2) random coefficients Analysis of variance (ANOVA) was estimated as described above to examine the effectiveness of the Responsible Spending module. The proportion of the variance accounted for by the fixed and random effects was statistically significant, R^2 conditional = .40 (Johnson, 2014). The Intervention × Time interaction was not a statistically significant predictor of knowledge and skills in responsible spending. Thus, no intervention effect was found for the Responsible Spending module when comparing the intervention group to the control group over time. Adding the covariates to this model using backward elimination demonstrated that: (1) girls scored higher knowledge and skills in responsible spending than boys and (2) pupils who always spoke Dutch at home scored higher knowledge and skills in responsible spending than pupils who did not always speak Dutch at home (see Figure 1 and Table 4).

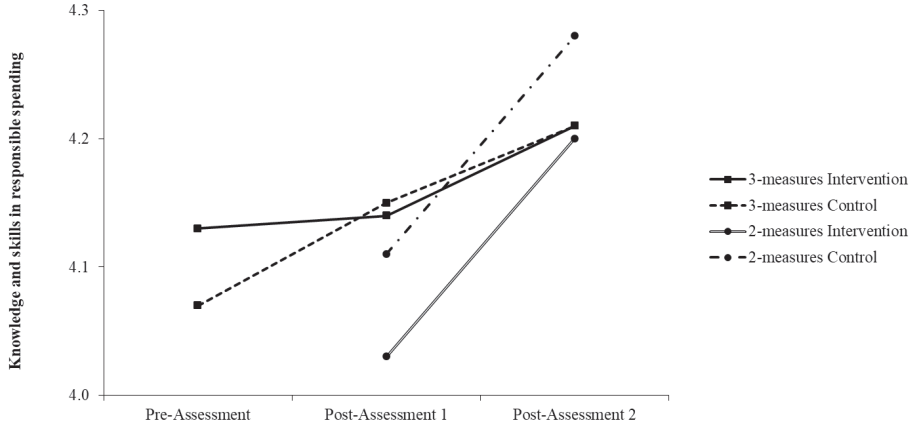

Figure 1. Fixed effects plot for the knowledge and skills in responsible spending. Pupils' knowledge and skills scores in responsible spending ranged from 0 to 5.

Table 4. *Mixed model analysis for the 3-measures group for knowledge and skills in responsible spending*[14]

Variable	*F*	Num *df.*	Den *df.*	*ICC*
Model 1				0.38[a]/0.03[b]
Intervention	0.05	1	65.4	
Time	6.52**	2	98.4	
Intervention × Time	0.63	2	98.5	
Model 2				0.38[a]/0.03[b]
Intervention	0.24	1	65.1	
Time	6.31**	2	96.3	
Intervention × Time	0.64	2	96.3	
Gender	23.97***	1	1,668.5	
Spoken language	11.46***	1	2,501.2	

Note. [a]ICC of the random intercept for pupils; [b]ICC of the random intercept for schools. The Satterthwaite method was used for the degrees of freedom; ** $p < .01$; *** $p < .001$

The main effect of Time was assessed for the two groups separately. For the intervention group, there was an effect of Time, $\chi^2(2) = 6.04$, $p = .049$, which resulted from a minor increase of performance between Post-Assessment 1 and Post-Assessment 2, $\Delta_{Means} = 0.069$, $z = 2.147$, $p = .032$, but no increase between Pre-Assessment and Post-Assessment 1, $\Delta_{Means} = 0.010$, $z = 0.233$, $p = .816$. Similarly, for the control group, the significant effect of Time, $\chi^2(2) = 7.70$, $p = .021$, stemmed from an increment between Post-Assessment 1 and Post-Assessment 2, $\Delta_{Means} = 0.069$, $z = 2.762$, $p = .006$, which was not present between Pre-Assessment and Post-Assessment 1, $\Delta_{Means} = 0.076$, $z = 1.349$, $p = .177$. Hence, both groups did not improve from the baseline assessment to the first post-assessment (after the Responsible Spending module took place); they only improved from the first post-assessment to the second post-assessment (after the Performing Transactions module took place). The increments, however, were similar for the intervention and the control group. This confirms the lack of an intervention effect for the Responsible Spending module (see Figure 1).[15]

[14]Time was not significant in model 1 and 2, when MI was used as a technique for treating missing data.
[15]Results based on MI showed that the increments for the intervention and control group were not significant. This also indicates the lack of an intervention effect for the Responsible Spending module.

2-Measures group for the knowledge and skills in responsible spending

A 2 Intervention (Intervention vs. Control) × 2 Time (Post-Assessment 1 vs. Post-Assessment 2) random coefficients ANOVA was estimated as described above to examine the effectiveness of the Responsible Spending module. The proportion of the variance accounted for by the fixed and random effects was statistically significant, R^2 conditional = .34. The Intervention × Time interaction was not a statistically significant predictor of knowledge and skills in responsible spending. Thus, no intervention effect was observed for the Responsible Spending module when comparing the intervention group to the control group over time. Adding the covariates to this model using backward elimination showed that pupils who always spoke Dutch at home scored higher knowledge and skills in responsible spending than those who did not always speak Dutch at home (see Table 5).

Table 5. *Mixed model analysis for the 2-measures group for knowledge and skills in responsible spending*[16]

Variable	*F*	Num *df.*	Den *df.*	*ICC*
Model 1				0.32[a]/0.00[b]
Intervention	2.73	1	1143.9	
Time	14.60***	1	50.7	
Intervention × Time	0.00	1	51.0	
Model 2				0.32[a]/0.00[b]
Intervention	2.35	1	1,054.6	
Time	14.92***	1	50.1	
Intervention × Time	0.03	1	50.5	
Spoken language	5.77*	1	1,846.7	

Note. [a]ICC of the random intercept for pupils; [b]ICC of the random intercept for schools. The Satterthwaite method was used for the degrees of freedom; * $p < .05$; *** $p < .001$

[16]Gender, spoken language, and peer pressure were significant in model 2, when MI was used as a technique for treating missing data. These results suggest that scores on knowledge and skills in responsible spending were higher for girls, children who always spoke Dutch at home, and children who experienced more peer pressure.

Similar to the 3-measures sample, we found a main effect of Time. For the intervention group, the performance of Post-Assessment 2 was better than Post-Assessment 1, $\Delta_{Means} = 0.171$, $z = 3.32$, $p = .002$, but this increment was comparable for the control group, $\Delta_{Means} = 0.165$, $z = 2.31$, $p = .025$. Thus, corroborating the earlier results, we found no effect of the intervention for the Responsible Spending module.[17]

3-Measures group for the knowledge and skills in performing transactions effectively

A 2 Intervention (Intervention vs. Control) × 3 Time (Pre-Assessment vs. Post-Assessment 1 vs. Post-Assessment 2) random coefficients ANOVA was estimated as described above to examine the effectiveness of the Performing Transactions module. The proportion of the variance accounted for by the fixed and random effects was statistically significant, R^2 conditional = .52. The Intervention × Time interaction was a statistically significant predictor of knowledge and skills in performing transactions effectively. Thus, an intervention effect was found for the Performing Transactions module when comparing the intervention group to the control group over time. Adding the covariates to this model showed that: (1) pupils who earned money from doing chores scored higher knowledge and skills in performing transactions effectively than those who did not earn money from doing chores, and (2) pupils who talked about money at home scored higher knowledge and skills in performing transactions effectively than those who did not talk about money at home (see Table 6).

[17]Results based on MI showed that the increment for the control group was not significant. Because the increments for the control and intervention group were comparable, this also indicates the lack of an intervention effect for the Responsible Spending module.

Table 6. *Mixed model analysis for the 3-measures group for knowledge and skills in performing transactions effectively*

Variable	*F*	Num *df.*	Den *df.*	*ICC*
Model 1				0.42[a]/0.11[b]
Intervention	5.64*	1	52.9	
Time	75.13***	2	60.3	
Intervention × Time	10.01***	2	60.3	
Model 2				0.42[a]/0.11[b]
Intervention	5.43*	1	52.8	
Time	73.46***	2	60.0	
Intervention × Time	9.92***	2	60.0	
Money from doing chores	10.83**	1	3,426.1	
Talking about money at home	13.55***	1	3,563.2	

Note. [a]ICC of the random intercept for pupils; [b]ICC of the random intercept for schools. The Satterthwaite method was used for the degrees of freedom; * $p < .05$; ** $p < .01$; *** $p < .001$

To probe the Intervention × Time interaction, simple effects of Intervention at different times were estimated. To avoid computational issues, the simple effects were tested with the χ^2 test (Lenth, 2019). The groups did not differ in their means neither at Pre-Assessment, $\chi^2(1) = 0.843$, $p = .359$, nor at Post-Assessment 1, $\chi^2(1) = 0.001$, $p = .973$, but they differed at Post-Assessment 2, $\chi^2(1) = 20.83$, $p < .001$, with the intervention group showing better performance than the control group (see Figure 2). Thus, the two groups were not different at the baseline assessment and the first post-assessment (following the Responsible Spending module); they were different only after the intervention (the Performing Transactions module) took place.

In addition, to better understand the effect of pretesting, it is interesting to probe the effect of Time for the two groups separately. For the intervention group, there was a clear effect of Time, $\chi^2(2) = 180.9$, $p < .001$, with an increase of performance between Pre-Assessment and Post-Assessment 1, $\Delta_{Means} = 0.337$, $z = 5.592$, $p < .001$, and a larger increase between Post-Assessment 1 and Post-Assessment 2, $\Delta_{Means} = 0.668$, $z = 8.221$, $p < .001$. For the control group, the significant effect of Time, $\chi^2(2) = 37.9$, $p < .001$, was due to an increment between Pre-Assessment and Post-Assessment 1, $\Delta_{Means} = 0.434$, $z = 5.248$, $p < .001$, which was not present between Post-Assessment 1 and Post-Assessment 2,

$\Delta_{Means} = 0.063$, $z = 0.555$, $p < .579$. Thus, both groups improved from the baseline assessment to the first post-assessment, but only the intervention group improved also from the first post-assessment to the second post-assessment. This shows the presence of an intervention effect for the Performing Transactions module over and beyond possible effects of repeated assessments (see Figure 2).

Furthermore, we explored whether the way children dealt with money influenced their gain in performing transactions knowledge and skills. Within the intervention group, the effect of time was assessed for: (1) children who always spoke Dutch at home vs. those who did not always speak Dutch at home, (2) children who talked about money at home vs. those who did not talk about money at home, (3) children who talked about money in class vs. those who did not talk about money in class, (4) children who received pocket money vs. those who did not receive pocket money, and (5) children who received money from doing chores vs. those who did not receive money from doing chores. There was an effect of time for all groups, that is, for the group that always spoke Dutch at home, $\chi^2(2) = 57.8$, $p < .001$, and for the group that did not always speak Dutch at home, $\chi^2(2) = 21.2$, $p < .001$; for the group that talked about money at home, $\chi^2(2) = 61.1$, $p < .001$, and for the group that did not talk about money at home, $\chi^2(2) = 22.1$, $p < .001$; for the group that talked about money in class, $\chi^2(2) = 53.2$, $p < .001$, and for the group that did not talk about money in class, $\chi^2(2) = 30.0$, $p < .001$; for the group that received pocket money, $\chi^2(2) = 58.8$, $p < .001$, and for the group that did not receive pocket money, $\chi^2(2) = 27.0$, $p < .001$; for group that received money from doing chores, $\chi^2(2) = 47.4$, $p < .001$, and for the group that did not receive money from doing chores, $\chi^2(2) = 46.4$, $p < .001$. Thus, the intervention effect for the Performing Transactions module was present regardless of the way children dealt with money.

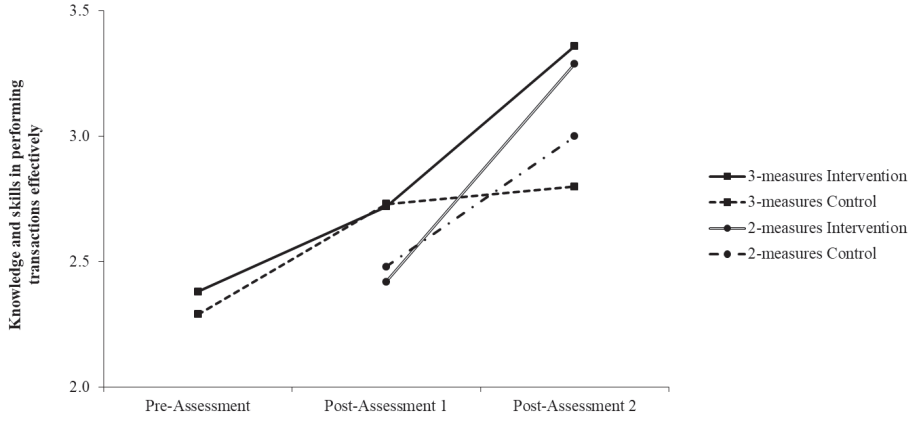

Figure 2. Fixed effects plot for the knowledge and skills in performing transactions effectively. Pupils' knowledge and skills scores in performing transactions effectively ranged from 0 to 6.

2-Measures group for the knowledge and skills in performing transactions effectively

A 2 Intervention (Intervention vs. Control) × 2 Time (Post-Assessment 1 vs. Post-Assessment 2) random coefficients ANOVA was estimated as described above to examine the effectiveness of the Performing Transactions module. The proportion of the variance accounted for by the fixed and random effects was statistically significant, R^2 conditional = .50. The Intervention × Time interaction was a statistically significant predictor of knowledge and skills in performing transactions effectively. Thus, an intervention effect was found for the Performing Transactions module when comparing the intervention group to the control group over time. Adding the covariates to this model using backward elimination suggested that: (1) pupils who were older scored higher knowledge and skills in performing transactions effectively than those who were younger and (2) pupils who talked about money at home scored higher knowledge and skills in performing transactions effectively than those who did not talk about money at home (see Table 7).

Table 7. *Mixed model analysis for the 2-measures group for knowledge and skills in performing transactions effectively*

Variable	*F*	Num *df.*	Den *df.*	*ICC*
Model 1				0.40[a]/0.08[b]
Intervention	2.09	1	62.5	
Time	95.68***	1	60.8	
Intervention × Time	6.75*	1	61.5	
Model 2				0.40[a]/0.07[b]
Intervention	2.59	1	61.8	
Time	80.41***	1	64.9	
Intervention × Time	6.70*	1	61.5	
Age	4.16*	1	1,781.9	
Talking about money at home	30.64***	1	2,170.0	

Note. [a]ICC of the random intercept for pupils; [b]ICC of the random intercept for schools. The Satterthwaite method was used for the degrees of freedom; * $p < .05$; *** $p < .001$

The simple effects of group at different times showed that the two groups were not different at Post-Assessment 1 (before the Performing Transactions module took place), $\chi^2(1) = 0.191$, $p = .664$, whereas they were clearly different at Post-Assessment 2 (after the Performing Transactions module took place), $\chi^2(1) = 6.466$, $p = .014$. This effect replicated the results obtained for the 3-measures sample.

Furthermore, similar to the 3-measures sample, we found an effect of assessment repetition. For the control group, in fact, Post-Assessment 2 showed a better performance than Post-Assessment 1, $\Delta_{Means} = 0.508$, $z = 4.45$, $p < .001$, but the improvement was almost twice as large for the intervention group, $\Delta_{Means} = 0.874$, $z = 10.50$, $p < .001$. Thus, replicating the previous results, we found an effect of the intervention for the Performing Transactions module which went over and beyond the mere effect of re-assessment.

We moreover explored whether the way children dealt with money influenced their improvement in performing transactions knowledge and skills. Similar to the 3-measures sample, there was an effect of time for all groups, that is, for the group that always spoke Dutch at home, $\chi^2(1) = 102.5$, $p < .001$, and for the group that did not always speak Dutch at home, $\chi^2(1) = 24.8$, $p < .001$; for the group that talked about money at home, $\chi^2(1) = 101.2$, $p < .001$, and for the group that did not talk about money at

home, $\chi^2(1) = 31.9$, $p < .001$; for the group that talked about money in class, $\chi^2(1) = 106.4$, $p < .001$, and for the group that did not talk about money in class, $\chi^2(1) = 23.2$, $p < .001$; for the group that received pocket money, $\chi^2(1) = 90.8$, $p < .001$, and for the group that did not receive pocket money, $\chi^2(1) = 56.3$, $p < .001$; for the group that received money from doing chores, $\chi^2(1) = 88.0$, $p < .001$, and for the group that did not receive money from doing chores, $\chi^2(1) = 64.2$, $p < .001$. Hence, similar to the 3-measures sample, the intervention effect for the Performing Transactions module was present regardless of the way children dealt with money.

Discussion

The present study examined the effectiveness of two modules (Responsible Spending and Performing Transactions) of a large-scale national financial education program in Dutch primary schools. Our results indicated that the Performing Transactions module increases fifth graders' knowledge and skills. Earlier work has shown a positive effect of financial education in the context of traditional pretest/post-test designs (Batty et al., 2015; Kalwij et al., 2019). The present finding echoes this effect based on the Solomon four-group design, which more tightly controls for any baseline effects of repeated testing. This finding underscores our argument that financial education programs, when they are well-designed and properly implemented, can increase children's financial knowledge and skills.

Interestingly, our results showed that fifth graders' knowledge and skills were not enhanced by the Responsible Spending module. This could indicate that children already had this knowledge or that the questions were relatively easy for them. In Pre-Assessment, children already answered most questions correctly. Still, there was an effect of time after the intervention for the Performing Transactions module took place, suggesting that this module helped children to answer the questions regarding responsible spending knowledge and skills

better. This suggestion, however, was not plausible because the increment in performance was similar for both the intervention and the control group. We therefore argue that the slight improvement in performance was related to children being exposed to responsible spending matters during the period between the first post-assessment (December 2016) and the second post-assessment (March 2017). For example, because they accompanied their parents, guardians, or caregivers to buy items at the supermarket or presents at stores for Christmas (December), New Year's Eve (January), or Valentine's Day (February).

To ensure that our intervention effects were robust to children-specific characteristics, the results concerning the program were obtained using analyses in which children's spoken language, gender, age, sensitivity to peer pressure, and their situation concerning talking about money at home, talking about money in class, pocket money, and money from doing chores were included as additional predictors. This allowed us to statistically control for these variables, but also to examine the relations of these variables with children's knowledge and skills in responsible spending and performing transactions effectively.

The relation between control variables and financial knowledge and skills

Our results demonstrated that children who always speak Dutch at home displayed higher financial knowledge and skills. These results could indicate that children who speak Dutch on a daily basis have higher knowledge and skills concerning financial matters or that these children are better able to understand the questions in the test and, therefore, provide more correct answers. It could be that these children understand financial matters better because they are able to connect what they have seen through television and in stores (items named in Dutch) to the questions they were asked. To our best knowledge, prior research never assessed the relationship between spoken language and financial knowledge and skills.

The fact that we did observe a positive relation between these variables may stimulate more research on this topic.

Our results moreover indicated that, as compared to children who do not talk about money at home, those who do talk about money at home displayed higher financial knowledge and skills. These results corroborate earlier findings (e.g., Romo & Vangelisti, 2014) and generalize these findings to a Dutch primary school context. Children who learn about financial matters from their parents', guardians', or caregivers' experiences are better able to relate those experiences to the questions they were asked.

In addition, as compared to children who do not earn money from doing chores, those who do earn money from doing chores are displaying higher financial knowledge and skills scores. This finding replicates some studies (e.g., Ramsey & Cruze, 2014), but contradicts others (e.g., Organization for Economic Co-operation and Development (OECD), 2014). In our opinion, earning money from doing chores can be viewed as part of activity-based learning, thereby enabling children to deal with money matters in practice and, hence, contributing positively to their financial learning process.

Our results additionally showed that the intervention effect for the Performing Transactions module was present regardless of whether or not children always spoke Dutch at home, whether or not children received pocket money, whether or not children talked about money at home, whether or not children talked about money in class, and whether or not children received money from doing chores. This suggests that the intervention effect of the Performing Transactions module was robust to the way children dealt with money.

Potential limitations and directions for future research

For practical and cost-related reasons, we restricted the test of the effectiveness of the Dutch financial education program to two of the five modules and focused on a subset of the targeted age group (fifth graders). The modules are provided at different time points during the school year according to the school's learning-teaching trajectory. In addition, no less than 124 primary schools and 2,650 pupils participated in our research. Hence, it was not feasible to carry out a study to cover all modules and all age groups. Further research, however, could examine the effectiveness of the remaining modules of the program and across different age groups.

Our research shows that knowledge and skills in performing transactions effectively can be learned well through a financial education module. An unanswered question is whether such knowledge and skills will affect children's actual financial behavior. Although we cannot answer this question with our presently reported results, a recent study showed that financial knowledge predicts several positive financial behaviors (Dare et al., 2020). Another question is whether children are able to acquire all financial competencies in an equally easy way. We did not find evidence that knowledge and skills in responsible spending can be increased by a financial education module. Apparently, fifth graders were exposed to responsible spending matters during the period December 2016 to March 2017 (before the Performing Transactions module took place). Why this exposure helped them to answer the responsible spending questions, but not those concerning performing transactions effectively could be related to the higher level of difficulty of the latter financial competency. Future studies could investigate whether or not the Responsible Spending module is effective at increasing the knowledge and skills of children in younger age groups (lower grades of primary school).

Last, in the present study, we assessed the short-term effect of the modules (covering Pre-Assessment in October 2016 to Post-Assessment 2 in March 2017) on children's financial knowledge and skills. We argue that if children receive financial education according to a continuous learning line in primary school (i.e., nonstop from first grade to sixth grade), it may improve their ability to make effective financial decisions later in life. Further research could investigate whether such constant early financial education can improve children's financial behavior in adulthood. Moreover, it could be assessed whether specific modules have a medium or long-term effect. For example, the Responsible Spending module focused on teaching children about the different factors that can influence their financial choices, thus it could have an effect on children's knowledge and skills in the medium or long term when they really have to make those choices.

Practical implications and conclusions

The present study contributes to the limited body of primary school-based financial education literature (e.g., Atkinson et al., 2015; Kalwij et al., 2019; OECD, 2013) by using a Solomon four-group design and mixed model analyses with variables that control for children-specific characteristics, thereby enabling us to draw more accurate conclusions.

Policymakers and educators can draw two main lessons from our results. The first lesson concerns the design of financial education programs in primary schools. It seems that programs that enable children to apply what they learn using daily life examples may improve their knowledge and skills regarding certain financial matters. This lesson is supported by recent research which argues that experiential learning (learning through experience) is a promising method to develop children's financial knowledge and skills (see Amagir, Groot, Van den Brink, & Wilschut, 2018, for further details).

Even though the two modules examined in the present study were designed and implemented in a similar way, we only found evidence for the effectiveness of one of the modules. As we remarked earlier, it appears that not all financial competencies can be learned well through a financial education module. This finding triggers the second lesson regarding the content of financial education programs in primary schools. It is important to measure the start level of children's knowledge and skills prior to implementing a financial education program. To investigate their start level of financial knowledge and skills, a pilot study (through a test) can be carried out in the development stage of the program. During this pilot study, it is crucial to investigate which financial competencies the program needs to focus on. It is furthermore of utmost importance to talk with the parents, caregivers, or guardians, to understand what financial areas they are (already) discussing with or teaching their children. Once the financial education program is developed, its effectiveness should moreover be assessed in the short term to allow for evidence-based improvement of the program. Doing so enables policymakers and educators to design and implement proper new financial education programs and, if necessary, to modify existing programs for this target group.

References

Amagir, A., Groot, W., Van den Brink, H. M., & Wilschut, A. (2018). A review of financial-literacy education programs for children and adolescents. *Citizenship, Social, and Economics Education, 17*(1), 56–80. https://doi.org/10.1177%2F2047173417719555

Atkinson, A., Messy, F., Rabinovich, L., & Yoong, J. (2015). *Financial education for long-term savings and investments: Review of research and literature* (Report No. 39). Organization for Economic Co-operation and Development. https://www.oecd-ilibrary.org/finance-and-investment/financial-education-for-long-term-savings-and-investments_5jrtgzfl6g9w-en

Barr, D. J., Levy, R., Scheepers, C., & Tily, H. J. (2013). Random effects structure for confirmatory hypothesis testing: Keep it maximal. *Journal of Memory and Language, 68*(3), 1–43. https://dx.doi.org/10.1016%2Fj.jml.2012.11.001

Batty, M., Collins, J. M., & Odders-White, E. (2015). Experimental evidence on the effects of financial education on elementary school students' knowledge, behavior, and attitudes. *Journal of Consumer Affairs, 49*(1), 69–96. https://doi.org/10.1111/joca.12058

Borman, S. (2006, June 28). *The expectation maximization algorithm: A short tutorial* [Lecture notes]. https://www.cs.utah.edu/~piyush/teaching/EM_algorithm.pdf

Bruhn, M., Leão, L., Legovini, A., Marchetti, R., & Zia, B. (2013). *Financial education and behavior formation: Large-scale experimental evidence from Brazil* (Report No. 6723). The World Bank. http://documents.worldbank.org/curated/en/753501468015879809/pdf/WPS6723.pdf

Chapman, S. J., & Freak, M. (2013). Personal Finance. In S. J. Chapman & M. Freak (Eds.), *New Concepts in Commerce* (pp. 1–351). John Wiley and Sons.

Chua, Y. P. (2012). Effects of computer-based testing on test performance and testing motivation. *Computers in Human Behavior, 28*(5), 1580–1586. https://doi.org/10.1016/j.chb.2012.03.020

CYFI (Child and Youth Finance International). (2013). *Children, youth, and finance: From momentum to action* (Report No. 1). Child and Youth Finance International. http://childfinanceinternational.org/resources/publications/children-youth-finance-from-momentum-to-action.pdf

Dare, S. E., Van Dijk, W. W., Van Dijk, E., Van Dillen, L. F., Gallucci, M., & Simonse, O. (2020). The road to financial satisfaction: Testing the paths of knowledge, attitudes, sense of control, and positive financial behaviors. *Journal of Financial Therapy, 11*(2), 1–30. https://doi.org/10.4148/1944-9771.1240

Dempster, A. P., Laird, N. M., & Rubin, D. B. (1977). Maximum likelihood from incomplete data via the EM algorithm. *Journal of the Royal Statistical Society, 39*(1), 1–22. https://doi.org/10.1111/j.2517-6161.1977.tb01600.x

Drentea, P. (2000). Age, debt, and anxiety. *Journal of Health and Social Behavior, 41*(4), 437–450. https://doi.org/10.2307/2676296

Fernandes, D., Lynch Jr., J. J., & Netemeyer, R. G. (2014). Financial literacy, financial education, and downstream financial behaviors. *Management Science, 60*(8), 1861–1883. http://dx.doi.org/10.1287/mnsc.2013.1849

Festus, A. B. (2013). Activity-based learning strategies in the mathematics classrooms. *Journal of Education and Practice, 4*(13), 8–14.

Graham, J. W., & Hofer, S. M. (2000). Multiple imputation in multivariate research. In T. D. Little, K. U. Schnabel & J. Baumert (Eds.), *Modeling longitudinal and multiple-group data: Practical issues, applied approaches, and specific examples* (pp. 201–218, 269–281). Lawrence Erlbaum Associates Publishers.

Green, A., & Preston, J. (2001). Education and social cohesion: Recentering the debate. *Peabody Journal of Education, 76*(3/4), 247–284. https://doi.org/10.1080/0161956X.2001.9682001

Hanushek, E. A., & Kimko, D. D. (2000). Schooling, labor-force quality, and the growth of nations. *American Economic Review, 90*(5), 1184–1208. http://dx.doi.org/10.1257/aer.90.5.1184

Haugh, M. (2015). *The EM algorithm* [Lecture notes]. http://www.columbia.edu/~mh2078/MachineLearningORFE/EM_Algorithm.pdf

Huck, S. W., & Sandler, H. M. (1973). A note on the Solomon 4-group design: Appropriate statistical analyses. *The Journal of Experimental Education, 42*(2), 54–55. https://doi.org/10.1080/00220973.1973.11011460

Johnson, P. C. D. (2014). Extension of Nakagawa & Schielzeth's R^2_{GLMM} to random slopes models. *Methods in Ecology and Evolution, 5*(9), 944–946. https://doi.org/10.1111/2041-210X.12225

Kaiser, T., & Menkhoff, L. (2017). *Does financial education impact financial behavior, and if so, when?* (Report No. 8161). The World Bank. http://documents.worldbank.org/curated/en/144551502300810101/Does-financial-education-impact-financial-literacy-and-financial-behavior-and-if-so-when

Kalwij, A. S., Alessie, R., Dinkova, M., Schonewille, G. A., Van der Schors, A., & Van der Werf, M. M. B. (2019). The effects of financial education on financial literacy and savings behavior: Evidence from a controlled field experiment in Dutch primary schools. *Journal of Consumer Affairs, 53*(3), 699–730. https://doi.org/10.1111/joca.12241

Kang, H. (2013). The prevention and handling of the missing data. *Korean Journal of Anesthesiology, 64*(5), 402–406. https://dx.doi.org/10.4097%2Fkjae.2013.64.5.402

Kobliner, B. (2017). *Make your kid a money genius (even if you're not): A parents' guide for kids 3 to 23*. Simon & Schuster.

Krueger, A. B., & Lindahl, M. (2001). Education for growth: Why and for whom? *Journal of Economic Literature, 39*(4), 1101–1136. https://doi.org/10.1257/jel.39.4.1101

Lane, J. (2016). *A debt effect? How is unmanageable debt related to other problems in people's lives?* (Report). Citizens Advice. https://www.citizensadvice.org.uk/Global/CitizensAdvice/Debt%20and%20Money%20Publications/The%20Debt%20Effect.pdf

Lenth, R. (2019, September 12). *Estimated marginal means, aka least-squares means* [Package]. CRAN. https://CRAN.R-project.org/package=emmeans

Lippman, P. (2016, December 21). What is activity based learning? *Places Created for Learning*. https://placescreatedforlearning.com/what-is-activity-based-learning/

Little, R. J. A. (1988). A test of missing completely at random for multivariate data with missing values. *Journal of the American Statistical Association, 83*(404), 1198–1202. https://doi.org/10.2307/2290157

Lusardi, A., & Mitchell, O. (2014). The economic importance of financial literacy: Theory and evidence. *Journal of Economic Literature, 52*(1), 5–44. https://doi.org/10.1257/jel.52.1.5

Madern, T. (2014). *Overkoepelende blik op de omvang en preventie van schulden in Nederland* [Overall view of the size and prevention of debts in the Netherlands] (Report). Nationaal Instituut voor Budgetvoorlichting [National Institute for Family Finance Information]. https://www.nibud.nl/wp-content/uploads/Rapport-2014-Overkoepelende-blik-op-de-omvang-en-preventie-van-schulden-in-Nederland.pdf

Miller, M., Reichelstein, J., Salas, C., & Zia, B. (2014). *Can you help someone become financially capable? A meta-analysis of the literature* (Report No. 6745). The World Bank. http://documents.worldbank.org/curated/en/297931468327387954/pdf/WPS6745.pdf

Mullainathan, S., & Shafir, E. (2013). *Scarcity: Why having too little means so much*. Henry Holt and Company.

Mundy, S. (2011). *Financial capability: Why is it important and how can it be improved?* (Report). CFBT Education Trust. https://www.educationdevelopmenttrust.com/EducationDevelopmentTrust/files/0f/0fbddece-6d06-478f-abd7-4c40ce591d0d.pdf

Nationaal Instituut voor Budgetvoorlichting [National Institute for Family Finance Information]. (2013). *Learning goals and competences for children and adolescents* (Report). Nationaal Instituut voor Budgetvoorlichting [National Institute for Family Finance Information]. https://www.nibud.nl/wp-content/uploads/Learning-goals-and-competences-for-children-and-adolescents.pdf

OECD (Organization for Economic Co-operation and Development). (2005). *Recommendation on principles and good practices for financial education and awareness* (Report). Organization for Economic Co-operation and Development. http://www.oecd.org/finance/financial-education/35108560.pdf

OECD (Organization for Economic Co-operation and Development). (2013). *Improving financial education effectiveness through behavioural economics: OECD key findings and way forward* (Report). Organization for Economic Co-operation and Development. https://www.oecd.org/daf/fin/financial-education/TrustFund2013_OECDImproving_Fin_Ed_effectiveness_through_Behavioural_Economics.pdf

OECD (Organization for Economic Co-operation and Development). (2014). *PISA 2012 results: Students and money, financial literacy skills for the 21st century* (Report No. 6745). Organization for Economic Co-operation and Development. https://www.mecd.gob.es/dctm/inee/internacional/pisa2012-financiera/internacionalpisa-2012financiera.pdf?documentId=0901e72b81a25880

O'Prey, L., & Shephard, D. D. (2014). *Financial education for children and youth: A systematic review and meta-analysis* (Report No. 1C). Aflatoun International. https://www.scribd.com/document/292998110/financialeducation-for-children-and-youth-systematic-review-and-meta-analysis-2014-pdf

Otto, A. M. C., Schots, P. A. M., Westerman, J. A. J., & Webley, P. (2006). Children's use of saving strategies: An experimental approach. *Journal of Economic Psychology, 27*(1), 57–72. https://doi.org/10.1016/j.joep.2005.06.013

Ramsey, D., & Cruze, R. (2014). *Smart money smart kids: Raising the next generation to win with money.* Lampo Press.

Romo, L. K., & Vangelisti, A. L. (2014). Money matters: Children's perceptions of parent-child financial disclosure. *Communication Research Reports, 31*(2), 197–209. http://dx.doi.org/10.1080/08824096.2014.907147

Rubin, D. B. (1987). *Multiple imputation for nonresponse in surveys*. John Wiley and Sons.

Schafer, J. L., & Graham, J. W. (2002). Missing data: Our view of the state of the art. *Psychological Methods, 7*(2), 147–177. https://doi.org/10.1037/1082-989X.7.2.147

Selker, R., Love, J., & Dropmann, D. (2019, April 22). *The 'jamovi' analyses* [Package]. CRAN. https://cran.r-project.org/web/packages/jmv/jmv.pdf

Sherraden, M. S., Johnson, L., Guo, B., & Elliott, W. (2011). Financial capability in children: Effects of participation in a school-based financial education and savings program. *Journal of Family and Economic Issues, 32*(3), 385–399. https://doi.org/10.1007/s10834-010-9220-5

Simonse, O. (2017). *Do education materials contribute to the financial capability of primary school students? Effectiveness study of financial education for the seventh grade* (Report). Wijzer in geldzaken [Money Wise platform]. https://www.wijzeringeldzaken.nl/platform-wijzeringeldzaken/publicaties/Contribution_of_education_materials_to_financial_capability_primary_school_students.pdf

Sledge, J., Tescher, J., & Gordon, S. (2010). *From financial education to financial capability: Opportunities for innovation* [White Paper]. Center for Financial Services Innovation. https://www.citigroup.com/citi/foundation/pdf/CFSI_FE_to_FC_White%20Paper_2010.pdf

Sociaal en Cultureel Planbureau [The Netherlands Institute for Social Research]. (2018). *Socio-economic status per postal code area* [Dataset]. Zorggegevens [Care data]. https://bronnen.zorggegevens.nl/Bron?naam=Sociaal-Economische-Status-per-postcodegebied

Social Science and Parliamentary Affairs Team. (2010). *Personal debt and consequences* (Report). Houses of the Oireachtas. https://www.oireachtas.ie/parliament/media/housesoftheoireachtas/libraryresearch/spotlights/Personal_Debt_and_Consequences.pdf

Solomon, R. L. (1949). An extension of control group design. *Psychological Bulletin, 46*(2), 137–150. https://psycnet.apa.org/doi/10.1037/h0062958

The jamovi project. (2019). *jamovi* (Version 0.9) [Computer Software]. Jamovi. https://www.jamovi.org

Webley, P. (2005). Children's understanding of economics. In M. Barrett & E. Buchanan-Barrow (Eds.), *Children's understanding of society* (pp. 43–67). Psychology Press.

Wijzer in geldzaken [Money Wise platform]. (2019). *Geldlessen.* https://www.geldlessen.nl/

Xiao, J. J., & O'Neill, B. (2016). Consumer financial education and financial capability. *International Journal of Consumer Studies, 40*(1), 712–721. http://dx.doi.org/10.1111/ijcs.12285

Yu, C. (2018). Threats to validity of research design. *Creative wisdom*. http://www.creative-wisdom.com/teaching/WBI/threat.shtml

Appendices

Appendix A. *Learning objectives of the Responsible Spending module*

1. Children understand that different desires lead to different choices.
2. Children understand that different factors can influence their choice.
3. Children realize that paying for a brand also involves paying for its brand name.
4. Children are aware of peer pressure and that it can influence their purchases.
5. Children know that there are cheaper and more expensive product types.
6. Children can make choices based on a limited budget.
7. Children can explain why companies advertise their products.
8. Children can estimate the value of money and products.

Note. Source: National Institute for Family Finance Information, 2013.

Appendix B. *Learning objectives of the Performing Transactions module*

1. Children get acquainted with a number of financial concepts related to paying with cash and a debit card.
2. Children get acquainted with the possibilities of a checking account.
3. Children know how to pay with a debit card in a safe manner.
4. Children recognize the standard symbols that are related to money.
5. Children investigate the authenticity of banknotes.
6. Children develop a proactive attitude toward financial matters.

Note. Source: National Institute for Family Finance Information, 2013.

Appendix C. *The test*

The test consisted of twenty-five questions. There were eleven questions to measure respondents' financial knowledge and skills scores. Five of these questions were related to the Responsible Spending module and six questions pertained to the Performing Transactions module. The remaining questions corresponded to the background of respondents (age, gender, and spoken language), the name of their school, in what way they dealt with money (whether they discussed financial matters in class or at home, whether they received pocket money, or earned money from doing chores), and to what extent they were sensitive to peer pressure (caused by commercials, friends, the desire to be the first, the desire to copy celebrities, and the fear of not belonging to a group).[18]

[18]The complete test can be provided upon request.

Appendix D. *Test questions of the intervention module Responsible Spending*

Question	Possible responses
1. Why do companies advertise? Choose 1 answer.	• To show you nice articles. • **Because they want you to buy their articles.** • To help you choose the best articles. • I do not know.
2. You see below 2 pictures of 1.5 liters bottles of cola and two prices. Connect each picture with the correct price ticket.	**AH cola is €0.85** **Coca-Cola is €1.90**
3. One cola bottle is more expensive than another cola bottle. Because … Choose 1 answer.	• The bottle looks nicer. • There is more cola in that bottle than in the other bottle. • **It is a brand name.** • Everyone wants cola. • I do not know.
4. You received €20 for your birthday. That is why you go with your parents to the mall to choose gifts. Below you can see all the products you can choose from. You can choose as many products as you want, but beware, you only have €20! Your parents want you to choose at least two gifts (so the €20 does not have to be spent entirely). Choose which presents you select.	• Kite €13 • Football €7 • Spring ball €12 • Diving glasses €9 • A game €10 • A book €12.50 • Nail polish €4 • Pawns €4 • Felt tip pens €2 **Two or more gifts should be selected that together cost (less than) €20.**
5. Do you think you chose the same presents as your classmates? Choose 1 answer.	• Yes, because I like the same things as my class. • No, because no advertising has been made for it. • **No, because boys and girls like other things.** • I do not know.

Note. Correct responses are printed in bold. For questions that regarded multiple answers, pupils had to choose all correct answers to be assigned one point.

Appendix E. *Test questions of the intervention module Performing Transactions*

Question	Possible responses
1. Pim goes to town with a friend. Pim just got a debit card from the bank and wants to buy something in town. He is at the cashier, but he forgot how to insert his pin code and on which buttons he has to press afterward. Which of the following answers do you think is the best answer? Choose 1 answer.	• Ask the cashier and let her do it with his pin code • **Go back home and ask his parents how he can pay with his debit card** • Ask the woman behind him if she wants to pay for him • I do not know
2. What happens if you insert the wrong pin code 3 times in the store?	• You get a tip • Your debit card will be taken away from you • **Your debit card will be blocked** • I do not know
3. Choose what words have to do with paying with a debit card. You can choose multiple answers.	• **The so-called Money Mule in Dutch (i.e., individuals who allow their bank account to be used against remuneration for criminal activities)** • **Checking account** • **Pin code** • **Electronic payment** • Change • **Overdrawing checking account** • **Exact payment** • Savings account • **Pin pad** • **Bankcard**
4. Imagine you want to pay with a debit card, where does the money come from? Choose 1 answer.	• **A checking account associated with a debit card.** • Savings account. • That money is in the debit card. • I do not know.
5. What is a checking account? Choose 1 answer.	• An account that you have to pay in a shop or restaurant • **A bank account that you need to be able to pay with your debit card** • A bank account with which you can pay without a debit card • I do not know
6. How can you see/feel/smell that a banknote is real (and not fake) (the security features)? You can choose multiple answers.	• **The word EYPΩ is on the banknote** • **A watermark** • **A signature on the banknote** • The ink has a rose scent • There must be an image of King Willem-Alexander on the banknote • **A silver-colored bond with the euro sign** • I do not know

Note. Correct responses are printed in bold. For questions that regarded multiple answers, pupils had to choose all correct answers to be assigned one point.

Chapter 3

The relation of financial knowledge and financial behavior with financial well-being: The case of the Netherlands

This research was submitted for publication.

Understanding the determinants of financial well-being with the aim of improving it is an important topic in behavioral finance and economic psychology, especially amid the financial challenges of the present era. The benefits of financial well-being are evident from different angles and reach far beyond the financial context. From an individual standpoint, financial well-being has been associated with various aspects of overall well-being, such as mental and physical health, happiness, relationship quality, and quality of life (Arber, Fenn, and Meadows, 2014; Brüggen et al., 2017; Netemeyer, Warmath, Fernandes, and Lynch, 2018; Raveendran et al., 2021). From an organizational perspective, it has also been shown that adopting financial well-being in policies, products, and operations leads to customer retention, acquisition, and value, improved brand and reputation, more business resilience due to more resilient customers, and a more productive and loyal workforce (Diener, 2000; UNSGSA, 2021). Furthermore, from a societal point of view, financial well-being contributes to general welfare because individuals have more spending capacity and rely less on social security benefits (Brüggen et al., 2017).

Individuals across the globe seek to improve their financial lives and ultimately achieve financial well-being, but this path is not always easy. For this reason, many countries have designed or are designing national strategies for financial literacy (OECD, 2015). So far, these strategies have attempted to reach over five billion people in sixty countries, and the number of participating countries is still increasing (Kaiser, Lusardi, Menkhoff, and Urban, 2020). As phrased by the American Consumer Financial Protection Bureau, “the ultimate measure of success for financial literacy efforts should be individual financial well-being” (CFPB, 2015, p. 9). Whereas previous work has shown little effect of financial education on financial behavior, especially in the longer term (Fernandes, Lynch, and Netemeyer, 2014), recent research has found positive effects at least three times as large as previously documented and no evidence for a considerable decay in effects over time (Kaiser et al.,

2020). In fact, it was indicated that the positive effects on financial behavior lasted for longer than two years after the intervention. This recent work provides confidence that financial literacy efforts may be successful at achieving financial well-being. In the present study, we adopted a broad definition of 'financial literacy efforts', covering not only the design of effective (educational) programs, practices, and interventions, but also the development of effective products, services, and (digital) tools. Hence, financial practitioners, such as advisors, psychologists, and coaches can benefit from understanding what factors affect financial well-being to design and provide effective financial literacy programs, practices, and interventions. At the same time, this information may be beneficial to financial service providers, such as banks, microfinance institutions, and insurance companies to create and offer effective products, services, and tools.

The purpose of the present study was to examine the relationship of the combination of objective and subjective financial knowledge and different types of positive financial behaviors with financial well-being, while controlling for several demographic factors. The reasoning was that individuals must understand the financial landscape including their financial affairs (objective knowledge), be confident about this financial understanding (subjective knowledge), and act according to this understanding (positive financial behaviors) to achieve financial well-being. Examples of positive financial behaviors are paying bills on time and active saving. We used data from a representative sample of the Dutch adult population (18-79 years), which were collected as part of the cross-national OECD/INFE financial literacy survey carried out in 2015. Results of this paper should contribute to the field of financial literacy by corroborating existing empirical evidence and extending its generalizability based on a representative sample of Dutch adults. We hypothesized that the combination of high objective and high subjective financial knowledge was associated with more financial well-being. We also hypothesized that some positive financial behaviors,

namely paying bills on time, active saving, covering normal living expenses, making considered purchases, and striving to achieve long-term goals, were associated with more financial well-being. Moreover, we performed an exploratory analysis for the relation of other financial behaviors, namely budgeting and keeping track of expenses, with financial well-being.

In the following, we review the literature on financial well-being, financial literacy and financial knowledge, and financial behavior. Next, we describe the measures and methods used, followed by the findings of the correlation and regression analyses. Finally, we discuss implications, limitations, and directions for future research.

Literature review

Financial well-being

Literature on financial well-being is scattered across various disciplines, such as economics (Gutter and Copur, 2011), psychology (Shim, Xiao, Barber, and Lyons, 2009), and marketing (Brüggen et al., 2017). This is likely a reason why there is still no standard way of defining and measuring it. According to Kempson, Finney, and Poppe (2017, p. 19), financial well-being is "the extent to which someone is able to meet all their current commitments and needs comfortably, and has the financial resilience to maintain this in the future". Netemeyer et al. (2018) conceptualized financial well-being as two dimensions, namely present financial well-being and expected future financial security. The United Nations Secretary-General's Special Advocate for Inclusive Finance for Development (UNSGSA, 2021, p. 4) described financial well-being as "the extent to which a person or family can smoothly manage their current financial obligations and have confidence in their financial future". Financial well-being is defined by Brüggen et al. (2017, p. 229) as "the

perception of being able to sustain current and anticipated desired living standards and financial freedom".

We see merit in the distinction between current and future financial well-being, but also argue that these concepts are often interrelated. For example, individuals who have excessive debts are likely to experience stress and less current financial well-being. However, these debts can also have negative consequences for future financial well-being because they might block goals, such as buying a house or financing an education. This notion suggests that individuals should first strive to get to a solid state of current financial well-being, before aiming to achieve or anticipate future financial well-being. Therefore, in the present study, we assessed *current financial well-being* and adopted the definition of Brüggen et al. (2017). This definition focuses on sustaining the current financial status to be able to achieve future financial freedom, and also has been used in comparable previous studies (Riitsalu and Murakas, 2019). To the best of our knowledge, the present study is only the second study using the four statements recommended in the OECD/INFE toolkit (2015) to construct financial well-being (see Riitsalu and Murakas, 2019, for the first study).

Akin to the discussion about the definition of financial well-being, there are differences in how financial well-being is measured (see Brüggen et al., 2017). While some studies focus on objective measures only (e.g., assets), others assess financial well-being with subjective measures such as satisfaction with one's economic situation. In the present study, we used such *a subjective measure*, as it also captures the broader, more intangible aspects of financial well-being, whereas objective financial well-being is limited to the tangible aspects (Dare et al., 2021).

Determinants of financial well-being

Kempson et al. (2017) were among the first to develop a comprehensive conceptual model of the determinants of financial well-being. Their model, which was tested in a representative sample of Norwegian adults aged over 15 years (N = 2,058), included several factors, namely socio-economic environment, knowledge and skills, psychological factors, and behaviors. In the present study, we used this model as the foundation to test the contribution of objective and subjective financial knowledge together and different types of positive financial behaviors on financial well-being in a representative sample of Dutch adults. Note that psychological factors were not included, because the present survey data did not assess these factors.

Financial knowledge. Financial knowledge concerns the stock of knowledge relating to personal finance concepts and products and can be acquired through education and experience (Huston, 2010). Some researchers have used financial literacy as a synonym for financial knowledge in the past, but these constructs are distinct. As stated by Huston (2010, p. 307), "financial knowledge is an integral dimension of, but not equivalent to, financial literacy". Financial literacy is defined by the OECD/INFE (2015, p. 5) as "a combination of awareness, knowledge, skill, attitude and behavior necessary to make sound financial decisions and ultimately achieve individual financial wellbeing". This definition implies that financial literacy comprises of several factors, including financial knowledge. Thus, to prevent confusion in the present study, we specifically refer to the construct 'financial knowledge'.

Financial knowledge can be measured in two ways, namely objectively, by using knowledge-based questions, and subjectively, by asking individuals to self-assess their knowledge level regarding (general) financial affairs (Lind et al., 2020; Robb and Woodyard,

2011). Individuals with objective knowledge understand the financial landscape, including the various aspects of their financial affairs, which make them feel like they have a grip on their financial situation. Such a grip enables these individuals to spend wisely, build savings, manage credit, and cope with financial adversities – all ingredients that help them perceive that they have achieved or are working on achieving financial well-being. In a similar vein, individuals with subjective knowledge are confident in their knowledge regarding financial affairs and, therefore, also in their ability to master or overcome any financial challenges. Such a proactive attitude enables these individuals to make progress toward their (distant) financial goals, which helps them perceive that they have reached or are working on reaching financial well-being. Indeed, previous studies have found that both objective and subjective financial knowledge are positively related to positive financial behaviors and financial well-being (Lind et al., 2020; Riitsalu and Murakas, 2019; Robb and Woodyard, 2011; Younas et al., 2019), and some studies even pointed to a stronger relation for subjective knowledge compared to objective knowledge (Lind et al., 2020; Riitsalu and Murakas, 2019). Nevertheless, it is important to realize that individuals are not always capable of judging their own knowledge accurately (Courchane, 2005). Behavioral finance insights have revealed that individuals often face dual illusions of knowledge and control, letting them think they have more knowledge and abilities than they have (Baker and Nofsinger, 2002; Robb and Woodyard, 2016). Such inaccurate knowledge assessments can be studied by combining objective and subjective knowledge. This approach classifies individuals in four categories: those with high objective and high subjective financial knowledge (i.e., correctly high confident individuals), those with low objective and low subjective financial knowledge (i.e., correctly low confident individuals), those with high objective, but low subjective financial knowledge (i.e., under-confident individuals), and those with low objective, but high subjective financial knowledge (i.e., over-confident individuals). Evidence often suggests that

both over-confidence and under-confidence are associated with poor financial behavior (Allgood and Walstad, 2016; Barber and Odean 2001; Lind et al., 2020; McCannon, Asaad, and Wilson, 2016; Robb, Babiarz, Woodyard, and Seay, 2015; Statman, Thorley, and Vorkink, 2006), although this is not always the case. For example, Xia, Wang, and Li (2014) showed that over-confidence was positively related to stock market participation, whereas under-confidence was negatively related to this behavior.

There is ample research on the relationship of the combination of objective and subjective knowledge with financial behavior and financial satisfaction (e.g., Robb and Woodyard, 2016), but to the best of our knowledge said research is limited in the financial well-being literature (Lind et al., 2020). This earlier work found that the best combination for both positive financial behavior and financial well-being was matched levels of high objective and high subjective financial knowledge, but they also found that over-confidence was better than under-confidence. It may well be the case that under-confidence impedes learning from experience because individuals do not believe in their own capacities.

In the 2015 OECD/INFE financial literacy survey, respondents were asked to answer seven questions concerning general financial matters (objective knowledge) and judge their own financial knowledge (subjective knowledge). The results indicated that, on average, only 56% of adults across participating countries and economies reached the minimum score of five out of seven on objective knowledge questions, compared to 62% across OECD countries and 64% in the Netherlands (OECD, 2016). Conversely, in most countries, respondents were able to judge their own financial knowledge in line with their actual financial knowledge. In a few countries, namely Brazil, Poland, South Africa, and Thailand, respondents reported over-confidence, meaning that they judged their own knowledge higher than their actual knowledge (OECD, 2016).

Financial behavior. Financial behavior concerns any kind of behavior relating to money management (Xiao, 2008). Positive financial behavior refers to behavior that leads to effective financial decisions supportive of financial well-being. For example, individuals who use a budget can monitor and control their spending. Similarly, individuals who make considered purchases often search for discounts and benefit from these efforts. Likewise, individuals who pay their bills on time prevent accumulated late-payment charges and fees. In a similar vein, individuals who actively save money can create a financial buffer as protection against financial shocks. All these positive financial behaviors leave financial room or accumulate capital for individuals to build their desired living standards and experience financial freedom, resulting in financial well-being. Having a financial buffer also leads to less rumination and stress, this is positively related to financial well-being (Van Dijk et al., 2021).

Financial behavior has been previously ascertained as the most powerful determinant of financial well-being (Brüggen et al., 2017; Garman and Forgue, 2006; Kempson et al., 2017; Shim et al., 2009; Xiao, Tang, and Shim, 2009). Positive financial behaviors, such as paying bills on time, covering normal living expenses, working toward financial goals, making considered purchases, budgeting, keeping track of expenses, active saving, striving to achieve long-term goals, avoiding risky decisions, and avoiding compulsive buying, were typically positively related to financial well-being (CFPB, 2015; OECD, 2016; Xiao, Sorhaindo, and Garman, 2006; Xiao et al., 2009), whereas poor financial behaviors, such as using credit for daily expenses were negatively related to financial well-being (Delafrooz and Paim, 2013; Finney, 2016). For some positive financial behaviors, however, the relationship with financial well-being remains unclear. For example, research by Finney (2016) and Gutter and Copur (2011) showed that keeping track of expenses and budgeting have negative relationships with financial well-being. It was explained that individuals who keep track of

expenses are more susceptible to realize that they lack financial resources, which puts pressure on their financial well-being.

The OECD/INFE financial literacy survey conducted in 2015 asked respondents to answer nine questions regarding positive financial behaviors. The results indicated that, on average, only 51% of adults across participating countries and economies reached the minimum score of six out of nine on behavior questions, compared to 54% across OECD countries and 45% in the Netherlands (OECD, 2016). Thus, many countries and economies show room for improvement regarding positive behaviors.

Hypotheses. As outlined in the previous section, objective and subjective financial knowledge have often been regarded as separate constructs that both are positively related to financial well-being. The relation of both types of knowledge with financial well-being, however, has not received much research attention (Lind et al., 2020). In the present study, we add to the existing literature by testing the following first hypothesis:

Hypothesis 1 The combination of high objective and high subjective financial knowledge is associated with more financial well-being.

Earlier studies have typically shown that several positive financial behaviors are positively related to financial well-being. These studies were based on different measurements of the two constructs (Brüggen et al., 2017; Kempson et al., 2017), including the OECD/INFE methodology as used in the present study (Riitsalu and Murakas, 2019). Still, for some positive financial behaviors, the relationship with financial well-being is unclear. As noted in the above, budgeting and keeping track of expenses have been found to have both a positive and negative association with financial well-being (Finney, 2016; Gutter

and Copur, 2011; Xiao et al., 2006, 2009). In the present study, we contribute to this line of research by testing the following second hypothesis within a representative Dutch sample:

Hypothesis 2 Paying bills on time, active saving, covering normal living expenses, making considered purchases, and striving to achieve long-term goals are associated with more financial well-being.

Regarding the financial behaviors for which mixed evidence was found in previous research, namely budgeting and keeping track of expenses, we carried out an exploratory analysis of their relationship with financial well-being.

Methodology

Data

The present study used Dutch data from a cross-national OECD/INFE financial literacy survey performed in 2015. All participating countries and economies (around 40) collected data according to the OECD/INFE toolkit (2015) to ensure internationally comparable data. Evidence shows that the OECD/INFE survey has been successful at capturing the financial literacy scores of diverse populations since its pilot study in 2010 (OECD/INFE, 2018). Because the data of the various participating countries and economies were not publicly available, we used only Dutch data for the present study (Dare, 2019).

The Netherlands is a constitutional monarchy located in Western Europe with territories in the Caribbean (Global Edge, 2020). Its Gross Domestic Product (GDP) per capita was USD 59,335 in 2020, ranking higher than the averages for both the OECD and the European Union (OECD, 2018). In well-being studies, the Netherlands ranked above the OECD average in terms of quality of the education system, employment, work-life balance,

life expectancy, water quality, and life satisfaction, but ranked below the OECD average in terms of income and wealth based on the average household net disposable income per capita (OECD, 2019). In financial literacy studies, the Netherlands ranked above the OECD average, the G20[19] average, and the global[20] average in terms of financial knowledge and financial attitudes scores, but ranked below the OECD average, the G20 average, and the global average in terms of financial behavior scores (OECD, 2016; 2017). Together, financial literacy scores in the Netherlands were higher than the G20 average and the global average, but lower than the OECD average.

The present financial literacy survey dataset comprised 1,080 Dutch citizens aged 18-79 randomly selected from the national online panel of Motivaction. The panel is active and certified according to ISO 26362. The survey was conducted online and funded by the Money Wise platform (*Wijzer in geldzaken*) of the Dutch Ministry of Finance. The OECD/INFE toolkit (2015) was used for the data collection process and the sample was representative of the general population of the Netherlands based on gender, age, and education. The sample characteristics of the present study are presented in Table 1.

[19]G20 is an intergovernmental forum consisting of nineteen countries and the European Union.
[20]The global average was calculated based on thirty countries and economies in Africa, Asia, Europe, Australasia, North America, and South America (see OECD, 2016, for the list of countries and economies).

Table 1. *Sample characteristics (N = 1,080)*

Variable	Category	%
Gender	Female	46.6
	Male	53.4
Age	18-29	12.5
	30-59	56.0
	60-79	31.5
Ethnicity	Dutch	91.1
	Non-Dutch	8.9
Living situation	Living alone	22.0
	Not living alone	78.0
Education	Less than secondary school	5.0
	Completed secondary school	35.0
	Technical or vocational education beyond secondary school	22.9
	University education	37.1
Occupation	In paid employment	43.6
	Self-employed	7.3
	Retired	19.1
	Student	4.4
	Not working	22.8
	Other/Don't know/Apprentice	2.8
Region	Three largest communities	11.0
	West Netherlands	27.8
	North Netherlands	10.7
	East Netherlands	22.7
	South Netherlands	23.9
	Smaller communities	3.9
Municipality	Large town (100,000 to about 1,000,000 inhabitants)	26.4
	Town (15,000 to about 100,000 inhabitants)	34.3
	Small town (3,000 to about 15,000 inhabitants)	21.3
	Village or rural area (less than 3,000 inhabitants)	16.4
	Don't know	1.6
Income	Up to €32,999 per year	34.7
	€33,000-€39,499 per year	15.2
	€39,500 or more per year	28.5
	Don't know	5.1
	Refused	16.5

Note. The category 'not working' for occupation includes homemakers, unemployed individuals, individuals not working due to poor health or sickness, and individuals not working and not searching for work.

Measures

The approach according to the OECD/INFE toolkit (2015; 2018) is to calculate three scores, concerning financial knowledge, financial attitudes, and financial behavior, and sum these scores to calculate the financial literacy score. Given that the present study used data collected as part of the international comparison of the OECD/INFE financial literacy survey, we aimed to calculate similar scores. Nevertheless, two differences should be noted. First, instead of assessing objective and subjective financial knowledge as separate variables, we used a combination of these variables because we argue that high objective and high subjective knowledge are together necessary to achieve more financial well-being. Second, the financial attitudes score was not included because it had a very low internal stability (Cronbach's alpha < .6) and it has been previously argued that this OECD/INFE measure is limited (Riitsalu and Murakas, 2019).

To assess financial well-being, we used four statements: (1) My financial situation limits my ability to do the things that are important to me, (2) I tend to worry about paying my normal living expenses, (3) I have too much debt right now, and (4) I am satisfied with my present economic situation. Responses to these statements were provided on a five-point scale (1 = strongly agree, 5 = strongly disagree). The scale of the last statement was reversely scored because of its wording. All responses were then averaged, whereby a higher score indicated more financial well-being (M = 3.510, SD = 0.979). The internal consistency of the financial well-being construct was good, with a Cronbach's alpha of .8 (George and Mallery, 2003). The external validity of this construct was also good, because it correlated with OECD/INFE statements that can be considered indicators of financial well-being. The first indicator was whether respondents had run short of money in the last 12 months (r = .575, p < .001). The second indicator was whether respondents were able to cover an unexpected

large cost (equal to their monthly income) without borrowing or asking friends or family for help ($r = .552$, $p < .001$).

Regarding objective financial knowledge, we used seven questions covering inflation, interest, risk and return, and the value of money over time (see Table 2). Correct answers were summed, whereby a higher score indicated more objective financial knowledge ($M = 4.901$, $SD = 2.061$). The internal consistency of the objective financial knowledge construct was good, with a Cronbach's alpha of .8 (George and Mallery, 2003). The external validity of this construct was also good, because earlier work using comparable scores demonstrated that objective knowledge is associated with financial well-being (Lind et al., 2020). Regarding subjective financial knowledge, we used the question: How would you rate your general knowledge of financial affairs compared to other adults in the Netherlands? Responses to this question were provided on a five-point scale (1 = very high, 5 = very low). The scale was reversely scored so that a higher score indicated more subjective financial knowledge ($M = 3.276$, $SD = 0.839$). Several previous studies have shown that a single-item measure can be used to assess subjective financial knowledge effectively (Lusardi and Tufano, 2015; Riitsalu and Murakas, 2019; Rosen and Sade, 2017; Xiao, Chen, and Sun, 2015).

To construct the combination of objective and subjective financial knowledge, we followed previous studies by Allgood and Walstad (2013) and Robb and Woodyard (2016). Respondents who scored at or below the median were classified as 'low', implying scores equal to or below 5 for objective financial knowledge and scale points equal to or below 3 for subjective financial knowledge. Respondents who scored above the median were classified as 'high', implying scores above 5 for objective financial knowledge and scale points above 3 for subjective financial knowledge. This resulted in four groups of respondents: those with high objective and high subjective financial knowledge (i.e., correctly high confident individuals, 25.0%), those with low objective and low subjective financial knowledge (i.e.,

correctly low confident individuals, 37.9%), those with high objective, but low subjective financial knowledge (i.e., under-confident individuals, 24.6%), and those with low objective, but high subjective financial knowledge (i.e., over-confident individuals, 12.5%).

Table 2. *Financial knowledge survey questions*

Question	Possible responses
1. Five brothers are given a gift of €1,000 in total. Now imagine that the brothers must wait for one year to get their share of the €1,000 and inflation stays at 1%. In one year's time, how much will they be able to buy?	Multiple choice: • More than they could buy today • The same amount • *Less than they could buy today* • It depends on the type of things they want to buy
2. You lend €25 to a friend one evening and he gives you €25 back the next day. How much interest has he paid on this loan?	Open response *0*
3. Suppose you put €100 into a savings account with a guaranteed interest rate of 2% per year. You don't make any further payments into this account, and you don't withdraw any money. How much would be in the account at the end of the first year once the interest payment is made?	Open response *€102*
4. And how much would be in the account at the end of five years?	Multiple choice: • *More than €110* • Exactly €110 • Less than €110 • This is impossible to say based on the available information
5. An investment with a high return is likely to be high risk.	True/False *True*
6. High inflation means that the cost of living is increasing rapidly.	True/False *True*
7. It is usually possible to reduce the risk of investing in the stock market by buying a wide range of stocks and shares.	True/False *True*

Note. Correct responses are printed in italics. The complete survey is available upon request.

Furthermore, we used several types of positive financial behaviors included in the Dutch financial literacy survey dataset and measured these behaviors according to the OECD/INFE methodology. For budgeting, we used two questions: Do you have a household budget? And who is responsible for making day-to-day decisions about money in your household? Respondents answered the first question with yes or no, and the second question with personally responsible, jointly responsible, or someone else is responsible. Having a household budget and personally or jointly managing households' financial decisions was classified as 'budgeting' and dummy-coded 1 (39.1%), whereas not having a household budget and someone else manages households' financial decisions was classified as 'not budgeting' and dummy-coded 0 (60.9%). For active saving, we used the question: Have you been saving money over the last 12 months regardless of whether you still have the money? Respondents answered yes or no to this question. Yes was classified as 'active saving' and dummy-coded 1 (79.5%), whereas no was classified as 'no active saving' and dummy-coded 0 (20.5%). For covering normal living expenses, we used the question: Sometimes people find that their income does not quite cover their living expenses. In the last 12 months, has this happened to you, personally? Respondents answered yes or no to this question. Yes was classified as 'not covering normal living expenses' and dummy-coded 0 (73.8%), whereas no was classified as 'covering normal living expenses' and dummy-coded 1 (26.2%). For keeping track of expenses, we used the statement: I keep a close personal watch on my financial affairs. For striving to achieve long-term goals, we used the statement: I set long-term financial goals and strive to achieve them. For making considered purchases, we used the statement: I carefully consider whether I can afford my purchases. For paying bills on time, we used the statement: I pay my bills on time. Responses to these four statements were provided on a five-point scale (1 = strongly agree, 5 = strongly disagree). And these scales were reversely scored so that a higher score indicated keeping better track of expenses (M =

4.223, *SD* = 0.995)[21], striving more to achieve long-term goals (*M* = 3.253, *SD* = 1.241)[22], making more carefully considered purchases (*M* = 4.374, *SD* = 0.899)[23], and paying bills on time more often (*M* = 4.545, *SD* = 0.865)[24]. For comparison purposes, we also calculated a composite positive financial behavior score as the sum of the seven types of positive financial behaviors described above (*M* = 4.758, *SD* = 1.505). To construct this composite measure, the original scale points 1 and 2 of the last four financial behaviors (keeping track of expenses, striving to achieve long-term goals, making considered purchases, paying bills on time) were classified as 'positive' and dummy-coded 1, whereas scale points 3 to 5 were classified as 'not positive' and dummy-coded 0. The behavior choosing financial products was excluded because many observations were missing due to unreported data (> 60% of the total sample).

As demographic factors, we used the following nine variables: gender (two categories: female [reference group], male), age (three categories: 18-29 [reference group], 30-59, 60-79)[25], ethnicity (two categories: Dutch [reference group], non-Dutch), living situation (two categories: living alone [reference group], not living alone), education (four categories: less than secondary school, completed secondary school, technical or vocational education beyond secondary school, university education [reference group]), occupation (six categories: in paid employment [reference group], self-employed, retired, student, not working, other/apprentice/don't know), income (five categories: up to €32,999 a year

[21]For comparison purposes, we also used the coded variable, where the scale points 1 and 2 were classified as 'keeping track' and dummy-coded 1 (75.8%), whereas scale points 3 to 5 were classified as 'not keeping track' and dummy-coded 0 (24.2%). Results were similar for both the coded and not coded variable.
[22]For comparison purposes, we also used the coded variable, where the scale points 1 and 2 were classified as 'striving to achieve long-term goals' and dummy-coded 1 (39.4%), whereas scale points 3 to 5 were classified as 'not striving to achieve long-term goals' and dummy-coded 0 (60.6%). Results were similar for both the coded and not coded variable.
[23]For comparison purposes, we also used the coded variable, where the scale points 1 and 2 were classified as 'making considered purchases' and dummy-coded 1 (81.2%), whereas scale points 3 to 5 were classified as 'not making considered purchases' and dummy-coded 0 (18.8%). Results were similar for both the coded and not coded variable.
[24]For comparison purposes, we also used the coded variable, where the scale points 1 and 2 were classified as 'paying bills on time' and dummy-coded 1 (87.0%), whereas scale points 3 to 5 were classified as 'not paying bills on time' and dummy-coded 0 (13.0%). Results were similar for both the coded and not coded variable.
[25]For comparison purposes, we also used age as a continuous variable. Results were similar for both the continuous and categorical variable.

[reference group], between €33,000 and €39,499 a year, €39,500 or more a year, don't know, refused), region (six categories: three largest communities [reference group], West Netherlands, North Netherlands, East Netherlands, South Netherlands, smaller communities), and municipality (five categories: large town [reference group], town, small town, village/rural area, don't know).

Data analysis

To study the relationship between the variables and test whether multicollinearity problems were present, pairwise correlations were calculated (see Table 3). Moreover, to understand the structure of these variables, distributions and frequencies were computed. Furthermore, to test the hypotheses, hierarchical multiple regression analyses were carried out. The dependent variable was financial well-being. All remaining variables served as independent or control variables. The first model included the first variable of primary concern, the four different combinations of high and low objective and subjective financial knowledge. In the second model, the second variable of primary concern, namely the different types of positive financial behaviors, were added. In the third model, the demographic factors were incorporated as the control variables. Results of these three models are presented in Table 4. All analyses were performed using IBM SPSS Statistics 26.

Results

Correlations

As evident in Table 3, results revealed that covering normal living expenses had the strongest positive correlation with financial well-being (r = .575, p < .001), followed by paying bills on time (r = .348, p < .001) and active saving (r = .326, p < .001). The combination of high objective and high subjective financial knowledge had a moderately

positive correlation with financial well-being ($r = .231$, $p < .001$), whereas the combination of low objective and low subjective financial knowledge had a moderately negative correlation with financial well-being ($r = -.196$, $p < .001$).

All independent and control variables had a significant correlation with financial well-being ($p < .05$), except for gender ($r = -.042$, $p = .177$), municipality ($r = -.027$, $p = .398$), region ($r = .006$, $p = .837$), the combination of high objective and low subjective financial knowledge ($r = .011$, $p = .725$), the combination of low objective and high subjective financial knowledge ($r = -.029$, $p = .356$), and making considered purchases ($r = .051$, $p = .104$). Among the independent and control variables, there was no sign of multi-collinearity problems because all correlations were below the common threshold range of 0.5-0.7 (Dormann et al., 2012). This was also confirmed by all variance inflation factors being below the common threshold of 5 (James, Witten, Hastie, and Tibshirani, 2017).

Regression results

Results of the three regression models described earlier are presented in Table 4. Model I included the four different combinations of high and low objective and subjective financial knowledge. This model was significant ($F = 23.388$, $p < .001$) and explained 7% of the variance in financial well-being. Almost all knowledge combinations were significant predictors of financial well-being except for the combination of low objective but high subjective financial knowledge ($\beta = .058$, $p = .079$). Respondents who scored high on both objective and subjective financial knowledge reported more financial well-being than those who scored low on both types of financial knowledge ($\beta = .282$, $p < .001$). Likewise, respondents who scored high on objective financial knowledge but low on subjective financial knowledge reported more financial well-being than those who scored low on both types of financial knowledge ($\beta = .116$, $p = .001$).

In Model II, the seven types of positive financial behaviors were added. This model was significant (F = 79.110, p < .001) and explained 44% of the variance in financial well-being, reflecting a large change in R^2 of .375 (p < .001) compared to Model I. Almost all positive financial behaviors were significant predictors of financial well-being except for striving to achieve long-term goals (β = .004, p = .887). Respondents who covered their normal living expenses (β = .466, p < .001), those who paid their bills on time (β = .202, p < .001), those who actively saved (β = .166, p < .001), and those who kept track of their expenses (β = .056, p = .044) reported more financial well-being. Whereas respondents who budgeted (β = -.085, p < .001) and those who carefully considered whether they could afford their purchases (β = -.065, p = .014) reported less financial well-being. Adding the different types of financial behaviors did not change the relationship between the knowledge combinations and financial well-being in Model II compared to Model I. That is, respondents who scored high on both objective and subjective financial knowledge reported more financial well-being than those who scored low on both types of financial knowledge (β = .157, p < .001). This was similar for respondents who scored high on objective financial knowledge but low on subjective financial knowledge (β = .090, p = .001).

In Model III, the final model, the nine demographic factors were incorporated as the control variables. The model was significant (F = 26.026, p < .001) and explained 49% of the variance in financial well-being, representing a minor change in R^2 of .049 (p < .001) compared to Model II. Age, income, region, and municipality were significant predictors of financial well-being. Whereas gender, education, occupation, ethnicity, and living situation were not. Respondents aged 60 to 79 years reported more financial well-being than those aged 18 to 29 years (β = .100, p = .044). Moreover, respondents who earned an income between €33,000 and €39,499 per year (β = .099, p < .001), those who earned an income of €39,500 or more per year (β = .192, p < .001), and those who refused to indicate their income

level (β = .105, p < .001) reported more financial well-being than those who earned an income up to €32,999 per year. Furthermore, respondents living in East Netherlands reported more financial well-being than those living in the three largest communities of the Netherlands (β = .091, p = .025). On the other hand, respondents living in a town with 15,000 to about 100,000 inhabitants reported less financial well-being than those living in a large town with 100,000 to about 1,000,000 inhabitants (β = -.095, p = .004). With the incorporated demographic factors, the combination of high objective but low subjective financial knowledge was no longer a significant predictor of financial well-being relative to the combination of low objective and low subjective financial knowledge (β = .048, p = .077). Thus, only the combination of high objective and high subjective financial knowledge was associated with more financial well-being relative to the reference group (β = .085, p = .004). This finding provides support for Hypothesis 1. Among the different types of financial behaviors, covering normal living expenses (β = .433, p < .001), paying bills on time (β = .184, p < .001), and active saving (β = .147, p < .001) were related to more financial well-being. Making considered purchases (β = -.054, p = .037), however, was associated with less financial well-being. These findings provide partial support for Hypothesis 2. Based on our exploratory analysis, it was moreover found that budgeting (β = -.071, p = .003) was associated with less financial well-being, whereas keeping track of expenses was no longer a significant predictor of financial well-being (β = .042, p = .129).

All OLS assumptions were checked and met (Burton, 2020), indicating that the present results are reliable and valid. The values of the residuals were independent (the Durbin-Watson statistic was 1.809 in Model I, 1.952 in Model II, and 2.018 in Model III), the variance of the residuals were constant (the scatter plots showed no obvious signs of funneling), the values of the residuals were normally distributed (the dots lied close to the

diagonal line in the normal P-P plots), and there were no influential cases biasing the model (Cook's Distance statistics were below 1).

We also carried out four robustness tests[26]. First, we ran the regression models outlined above using the combination of objective and subjective financial knowledge classified based on mean scores instead of median scores.[27] Second, we ran the models using the composite measure of the seven positive financial behaviors instead of the different types of financial behaviors separately[28]. Third, we ran the models in a subsample of the original dataset, consisting of only those respondents who personally or jointly made their households' day-to-day financial decisions (n = 974). Fourth, we ran the models in another subsample of the original dataset, excluding all missing observations due to unreported data (n = 936)[29]. Results based on these four robustness tests remained practically equivalent, indicating that the results presented in this paper are reliable and stable.

[26]Results of the robustness tests can be provided upon request.
[27]Following prior work by Lind *et al.* (2020), we classified objective and subjective financial knowledge scores based on the mean instead of the median. The mean of objective financial knowledge was 4.901 and the mean of subjective financial knowledge was 3.276, resulting in the following four groups: correctly high confident respondents (29.8%), correctly low confident respondents (28.5%), under-confident respondents (33.9%), and over-confident respondents (7.8%).
[28]The composite measure of positive financial behaviors had a significant positive relation with financial well-being (Model II: $\beta = .363$, $p < .001$; Model III: $\beta = .298$, $p < .001$).
[29]The missing observations refer to the category 'don't know' for occupation, municipality, and income as depicted in Table 1.

Table 3. *Correlations (N = 1,080)*

Variable		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1.	Financial well-being	**-.196**	**.231**	.011	-.029	**-.075**	**.326**	**.575**	**.143**	**.092**	.051	**.348**	-.042	**.106**	**.072**	**-.092**	**.162**	**-.124**	**.245**	.006	-.027
2.	Low objective and low subjective*	–	**.452**	**.446**	**.295**	.005	**.089**	**.068**	**-.110**	**-.119**	-.053	**-.128**	**.212**	**-.132**	.018	.005	**.215**	**.210**	**.273**	.039	**.138**
3.	High objective and high subjective		–	**.330**	**.218**	.003	**.120**	**.128**	**.158**	**.152**	.034	**.115**	**.217**	**.100**	.033	.055	**.207**	**.198**	**.300**	.061	.094
4.	High objective and low subjective			–	**.215**	**.064**	.026	.033	**-.116**	-.032	-.050	-.014	**.103**	-.010	.011	.017	**.114**	**.114**	.080	.068	.091
5.	Low objective and high subjective				–	**.081**	.008	.025	**.107**	.016	**.097**	.054	**.106**	**.075**	.056	**.087**	**.100**	**.160**	**.149**	.099	.073
6.	Budgeting					–	**.098**	.017	**.086**	**.192**	.058	.021	.035	-.004	.024	.031	.009	**.123**	**.122**	.038	.069
7.	Active saving						–	**.272**	.033	**.149**	-.008	**.110**	.008	**-.161**	.045	.012	**.193**	**.181**	**.258**	.062	.095
8.	Covering normal living expenses							–	.051	**.062**	**.067**	**.239**	.030	.000	**.111**	**.082**	**.127**	**.199**	**.292**	.085	.094
9.	Keeping track of expenses								–	**.303**	**.399**	**.356**	.034	**.195**	.036	-.014	**-.065**	.008	-.004	-.052	.027
10.	Striving to achieve long-term goals									–	**.158**	**.113**	-.013	-.012	-.047	-.055	**.080**	**-.069**	.059	-.020	-.039
11.	Making considered purchases										–	**.319**	.058	**.146**	.039	-.036	**-.070**	.025	-.031	.033	.053
12.	Paying bills on time											–	**.106**	**.142**	**.082**	-.058	.002	-.021	.035	.017	.033
13.	Gender												–	-.015	.016	**.098**	**.105**	**.258**	**.233**	.038	**.166**
14.	Age													–	-.009	.054	**-.268**	**.131**	-.027	-.011	.047
15.	Ethnicity														–	.008	**.098**	.102	.038	**.182**	**.108**
16.	Living situation															–	.057	.090	**.285**	**.123**	**.122**
17.	Education																–	**.208**	**.184**	.085	**.102**
18.	Occupation																	–	**.234**	.074	**.110**
19.	Income																		–	.079	**.086**
20.	Region																			–	**.287**
21.	Municipality																				–

Note. *Reference group. Significant correlations are printed in bold ($p < .05$). Pearson's correlation coefficients between continuous variables, Cramer's V between categorical variables, and point biserial correlation between continuous and categorical variables were calculated.

Table 4. *Regression results with financial well-being as the dependent variable (N = 1,080)*

Variable	Model I β (*SE*)	Model II β (*SE*)	Model III β (*SE*)
High objective and high subjective	.282 (.077)***	.157 (.061)***	.085 (.066)**
High objective and low subjective	.116 (.077)**	.090 (.060)**	.048 (.061)
Low objective and high subjective	.058 (.097)	.031 (.076)	.024 (.076)
Budgeting		-.085 (.049)***	-.071 (.048)**
Active saving		.166 (.061)***	.147 (.061)***
Covering normal living expenses		.466 (.056)***	.433 (.057)***
Keeping track of expenses		.056 (.028)*	.042 (.027)
Striving to achieve long-term goals		.004 (.020)	-.016 (.020)
Making considered purchases		-.065 (.029)*	-.054 (.028)*
Paying bills on time		.202 (.030)***	.184 (.030)***
Income (ref.: up to €32,999 per year)			
€33,000-€39,499 per year			.099 (.073)***
€39,500 or more per year			.192 (.069)***
Don't know			.000 (.117)
Refused			.105 (.072)***
Gender (ref.: female)			.025 (.050)
Age (ref.: 18-29)			
30-59			.019 (.086)
60-79			.100 (.105)*
Dutch (ref.: non-Dutch)			.002 (.082)
Living situation (ref.: living alone)			.010 (.058)
Education (ref.: university)			
Less than secondary school			-.011 (.111)
Complete secondary school			-.043 (.061)
Technical/vocational beyond secondary school			-.045 (.064)
Occupation (ref.: in paid employment)			
Self-employed			.044 (.092)
Retired			.030 (.091)
Student			-.001 (.138)
Not working			-.012 (.065)
Don't know/apprentice/other			.006 (.147)
Municipality (ref.: large town [100,000 to about 1,000,000 inhabitants])			
Town (15,000 to about 100,000 inhabitants)			-.095 (.067)**
Small town (3,000 to about 15,000 inhabitants)			-.046 (.074)
Village or rural area (less than 3,000 inhabitants)			-.047 (.080)
Don't know			-.012 (.193)
Region (ref.: three largest communities)			
West Netherlands			.072 (.093)
North Netherlands			.065 (.109)
East Netherlands			.091 (.095)*
South Netherlands			.038 (.096)
Smaller communities			.022 (.144)
R^2	.065	.440	.489
Adjusted R^2	.062	.434	.470

Notes. A constant is included but not reported. *SE* is standard error. β is standardized coefficient. Ref. is the reference group. *$p < .05$; ** $p < .01$; *** $p < .001$

Discussion

Financial well-being brings benefits to individuals, organizations, and societies and these benefits are beyond the financial context (Brüggen et al., 2017; Netemeyer et al., 2018). Recent research suggests that financial literacy efforts are supportive of financial well-being (Kaiser et al., 2020). We defined such efforts in a broad manner, referring to financial literacy programs, practices, and interventions, as well as, financial products, services, and tools. Hence, financial practitioners and service providers can gain from understanding what factors affect financial well-being, to be able to develop effective efforts. Previous studies have highlighted the importance of several factors, including objective and subjective financial knowledge and financial behaviors (e.g., Kempson et al., 2017; Riitsalu and Murakas, 2019). In the present study, we sought to corroborate existing empirical evidence and increase its generalizability by examining how the combination of objective and subjective financial knowledge and different types of positive financial behaviors affect financial well-being within a representative sample of Dutch adults.

Summary of findings and implications

We performed hierarchical regression analysis with three models. The first model included our first variable of primary concern, the four different combinations of high and low objective and subjective financial knowledge, to assess the contribution of financial knowledge to financial well-being. The second model added our second variable of primary concern, the different types of positive financial behaviors, to assess whether the relation of financial behavior with financial well-being depends on the type of behavior. The third and final model incorporated several demographic factors as the control variables, to assess whether the association of the combination of objective and subjective financial knowledge and the different financial behaviors with financial well-being remained intact.

In line with Hypothesis 1, we found that the combination of high objective and high subjective financial knowledge was associated with more financial well-being compared to the combination of low objective and low subjective financial knowledge. This finding remained consistent across all three models and corroborates previous research. These studies have reported that individuals benefit from high subjective knowledge only when they also have high objective knowledge (Peters et al., 2019) and that the best combination for financial well-being is matched levels of high objective and high subjective knowledge (Lind et al., 2020). Interesting yet surprising is that the combination of high objective but low subjective financial knowledge (under-confidence) was associated with more financial well-being compared to the combination of low objective and low subjective financial knowledge in the first two models. This finding shows the opposite of what was found in prior work (Lind et al., 2020), where over-confidence was better for financial well-being than under-confidence. However, after controlling for the demographic factors in the third model, the combination of high objective but low subjective financial knowledge was no longer related to financial well-being. Together, these findings point to the need to address both types of financial knowledge in financial literacy efforts, as also highlighted by other researchers (Riitsalu and Murakas, 2019). Earlier work has indicated that financially knowledgeable individuals are better able to interact with their service providers to optimize their financial well-being (Valant, 2015; Van der Cruijsen, De Haan, and Roerink, 2020). In today's digital era, for example, financial practitioners could share anonymous real-life personal or client experiences (both positive and negative) through social media channels to teach individuals about the risks and opportunities involved with specific financial products and services. Financial service providers could also support this approach by offering interactive tools to enable individuals to try the acquired knowledge in virtual game scenarios (Riitsalu and Murakas, 2019), before moving these scenarios into real life.

Consistent with Hypothesis 2, we found that paying bills on time, covering normal living expenses, and active saving were associated with more financial well-being. Unexpectedly, the data also showed that making considered purchases was associated with less financial well-being and striving to achieve long-term goals was not related to financial well-being. According to our exploratory analysis, we furthermore found that budgeting was associated with less financial well-being and keeping track of expenses was not related to financial well-being. The fact that striving to achieve long-term goals was not significantly related to financial well-being may be related to the present, short-term measure of financial well-being in the current study. The non-significant result concerning keeping track of expenses contradicts previous research which demonstrated that this behavior was either negatively (Finney, 2016) or positively (Xiao et al., 2006, 2009) related to financial well-being. Perhaps the profit generated from keeping track of expenses is not sufficiently large to impact financial well-being, for example, because this behavior is tedious. The finding that budgeting was negatively related to financial well-being is consistent with some studies (Gutter and Copur, 2011), but not with others (Xiao et al., 2006, 2009). It is likely that individuals who find it difficult to make ends meet due to limited financial resources are forced to make a budget and stick to it. This budgeting behavior out of necessity generates stress and discomfort, leading to less financial well-being. It is also possible that the relationship runs in the opposite direction, meaning that some individuals have low financial well-being and, therefore, feel the need to budget. A similar line of reasoning can be used to argue the negative association of making considered purchases with financial well-being. Recently, Dare et al. (2020) explained that positive financial behaviors were not positive by all means and showed that some positive financial behaviors, namely adjusting spending and keeping track of expenses, were negatively related to financial satisfaction. With the present study, we broaden the literature by showing that this notion may also apply to the broader

construct of financial well-being. This finding also suggests that it is valuable for financial practitioners to identify why or why not individuals engage in specific (positive) financial behaviors, to be able to help them choose the right behaviors at the right time, and understand the (positive and/or negative) implications of these behaviors.

Financial practitioners could help individuals formulate S.M.A.R.T. targets (which are specific, measurable, achievable, realistic, and timely) regarding the positive financial behavior that they need to improve on and coach them to monitor and work toward achieving the target. As individuals see that they are making progress toward their target, this might motivate them to continue working toward the target. Also here, financial service providers can support this approach by offering digital tools to monitor the progress that individuals are making or direct them to perform particular behaviors. For example, if individuals want to improve their on-time payment behavior, service providers may offer just-in-time alerts when they need to make a payment on their bills (e.g., every end of the previous month). Another example is if individuals are working on improving their savings behavior, service providers can offer automatic savings products (standing orders). Recent research has indicated that service providers should shape individuals' financial behavior rather than respond to it (PWC, 2018). For example, Raveendran et al. (2021) explained that providers could create an engaging interface at the front end to help individuals visualize their financial needs and set their financial goals, in addition to customer insights or behavioral analytics and intervention recommendation system at the back end to provide individuals with personalized nudges or actionable steps to navigate their goal journey at each stage of their life.

Among the demographic control variables, two results demand further attention. First, the strong positive association found between income and financial well-being in the Netherlands corroborates earlier findings in Estonia (Riitsalu and Murakas, 2019), Australia (Muir et al., 2017), and the United States (Netemeyer et al., 2018). Second, older individuals

in the Netherlands reported more financial well-being than the younger cohort, which is in line with previous findings in Norway (Kempson et al., 2017), but contrary to those in Estonia (Riitsalu and Murakas, 2019). Both results seem intuitive, because the more income individuals have, the more they can spend and, the older they get, the more capital they have accumulated to spend. Spending money on whatever these individuals want can help them enjoy life according to their desired living standards, leading to financial well-being.

Limitations and directions for future research

The OECD/INFE financial literacy survey provided sufficient data to conduct an initial test of the relation of financial knowledge and financial behavior with financial well-being in the Netherlands. Nevertheless, future research should address the limitations of the present study. Due to the correlational design of our study, causality could not be determined. It might be that indeed financial knowledge and financial behavior increase financial well-being, but the causal relationship could also be reverse. For example, individuals who have high financial well-being seek to understand the financial landscape including their financial affairs and engage in positive financial behaviors to maintain their solid state of financial well-being. Conversely, individuals who have low financial well-being might not feel the need to acquire financial knowledge or feel incapable of performing positive financial behaviors. The focus of these individuals is likely to make ends meet each month. To make better assumptions about a certain causal path, in future studies, similar analyses could be performed using a longitudinal or experimental design (Kalwij et al., 2019). In addition, the present results are based on potentially limited measures of positive financial behavior and financial well-being. One might question whether the single items adequately represent the different types of financial behaviors. Furthermore, one could wonder whether the obtained results for current financial well-being also hold for future financial well-being. These

questions could be addressed in future studies, in which multiple-item measures of financial behaviors are included and also future financial freedom is assessed.

Conclusions

The benefits of financial well-being are apparent from an individual, organizational, and societal perspective (Brüggen et al., 2017). Financial practitioners and service providers have the opportunity or responsibility to help individuals develop and maintain a solid sense of financial well-being. It is, therefore, crucial for these practitioners and service providers to know what factors affect financial well-being. Our study contributes to this quest by examining the contribution of the four different combinations of high and low objective and subjective financial knowledge and different types of positive financial behaviors to financial well-being, while controlling for several demographic factors.

Our results suggest that financial literacy efforts should not only address both types of financial knowledge with the aim to achieve a high level of both, but also help individuals to engage in specific positive financial behaviors (take action). Although our recommendation is based on a study within a Dutch sample, it is in accordance with that of researchers who conducted comparable research in other countries (Lind et al., 2020; Riitsalu and Murakas, 2019). In a recent study (Dare et al., 2020), it was argued that some behaviors (adjusting spending and keeping track) are painful to do in the short term but may be beneficial for financial satisfaction in the long term. In the present study, we showed comparable findings for the broader concept of financial well-being. Thus, financial literacy initiatives should help individuals realize that, although some behaviors, such as budgeting and making considered purchases, may be unpleasant to perform in the short term, they may benefit financial well-being in the long term.

References

Allgood, S. and Walstad, W. B. (2016), "The effects of perceived and actual financial literacy on financial behaviors", *Economic Inquiry*, Vol. 54 No. 1, pp. 675–697.

Arber, S., Fenn, K. and Meadows, R. (2014), "Subjective financial wellbeing, income and health inequalities in mid and later life in Britain", *Social Science and Medicine*, Vol. 100, pp. 12–20. http://dx.doi.org/10.1016/j.socscimed.2013.10.016

Baker, H. K. and Nofsinger, J. R. (2002), "Psychological biases of investors", *Financial Services Review*, Vol. 11 No. 2, pp. 97–116.

Barber, B. M. and Odean, T. (2001), "The Internet and the Investor", *Journal of Economic Perspectives*, Vol. 15 No. 1, pp. 41–54. http://dx.doi.org/10.1257/jep.15.1.41

Brüggen, E., Hogreve, J., Holmlund, M., Kabadayi, S. and Lofgren, M. (2017), "Financial well-being: A conceptualization and research agenda", *Journal of Business Research,* Vol. 79, pp. 228–237. http://dx.doi.org/10.1016/j.jbusres.2017.03.013

Burton, A. L. (2020), "OLD (Linear) Regression", Barnes, J. C. and Forde, D. R. (Eds.), *The encyclopedia of research methods and statistical techniques in criminology and criminal justice*, Wiley, New York, NY, pp. 509-514. http://dx.doi.org/10.1002/9781119111931.ch104

CFPB (Consumer Protection Financial Bureau). (2015), "Financial well-being: The goal of financial education", research report, CFPB, Washington, DC, January, https://files.consumerfinance.gov/f/201501_cfpb_report_financial-well-being.pdf

Courchane, M. J. (2005), "Consumer literacy and creditworthiness", paper presented at the Federal Reserve System Community Affairs Research Conference, 7-8 April, Washington, DC, available at: https://econpapers.repec.org/paper/fipfedhpr/950.htm (accessed 15 October 2019).

Dare, S. (2019), *OECD/INFE 2015 dataset*, Open Science Framework, available at: https://osf.io/k7w6z (accessed 24 November 2019).

Dare, S., van Dijk, W., van Dijk, E., van Dillen, L. F., Gallucci, M. and Simonse, O. (2020), "The road to financial satisfaction: Testing the paths of knowledge, attitudes, sense of control, and positive financial behaviors", *Journal of Financial Therapy,* Vol. 11 No. 2, pp. 1–30. https://doi.org/10.4148/1944-9771.1240

Dare, S., van Dijk, W., van Dijk, E., van Dillen, L. F., Gallucci, M. and Simonse, O. (2021), "How executive functioning and financial self-efficacy predict subjective financial well-being via positive financial behaviors", *Manuscript submitted for publication*.

Delafrooz, N. and Paim, L. H. (2013), "Role of financial stress on relationship between financial problem and financial wellness among Malaysia workers", *African Journal of Business Management*, Vol. 7 No. 20, pp. 1966–1972. https://doi.org/10.5897/AJBM12.082

Diener, E. (2000), "Subjective well-being: The science of happiness and a proposal for a national index", *American Psychologist*, Vol. 55 No. 1, pp. 34–43. http://dx.doi.org/10.1037//0003-066X.55.1.34

Dormann, C. F., Elith, J., Bacher, S., Buchmann, C., Carl, G., Carré, G. et al. (2012), "Collinearity: A review of methods to deal with it and a simulation study evaluating their performance", *Ecography*, Vol. 36 No. 1, pp. 27–46. https://doi.org/10.1111/j.1600-0587.2012. 07348.x

Fernandes, D., Lynch, J. G. and Netemeyer, R. G. (2014), "Financial literacy, financial education, and downstream financial behaviors", *Management Science*, Vol. 60 No. 8, pp. 1861–1883. http://dx.doi.org/10.1287/mnsc.2013.1849

Finney, A. (2016), "Defining, measuring and predicting financial capability in the UK", available at: www.bristol.ac.uk/media-library/sites/geography/pfrc/pfrc-1613-components-of-fincap.pdf (accessed 20 October 2021).

Garman, E. T. and Forgue, R. E. (2006), *Personal finance*, Houghton Mifflin Co, Boston.

George, D and Mallery, P. (2003), *SPSS for Windows step by step: A simple guide and reference,* Allyn & Bacon, Boston.

Global Edge. (2020), "Global insights Netherlands", available at: https://globaledge.msu.edu/countries/netherlands (accessed 20 November 2021).

Gutter, M. and Copur, Z. (2011), "Financial behaviors and financial well-being of college students: evidence from a national survey", *Journal of Family and Economic Issues*, Vol. 32 No. 4, pp. 699–714. https://psycnet.apa.org/doi/10.1007/s10834-011-9255-2

Huston, S.J. (2010), "Measuring financial literacy", *Journal of Consumer Affairs*, Vol. 44 No. 2, pp. 296–316, https://doi.org/10.1111/j.1745-6606.2010.01170.x

James, G., Witten, D., Hastie, T., Tibshirani, R. (2017), *An introduction to statistical learning with applications in R*, Springer-Verlag, New York.

Kalwij, A., Alessie, R., Dinkova, M., Schonewille, G., Van der Schors, A. and Van der Werf, M. (2019), "The effects of financial education on financial literacy and savings behavior: Evidence from a controlled field experiment in Dutch primary schools", *Journal of Consumer Affairs*, Vol. 53 No. 3, pp. 699–730. https://doi.org/10.1111/joca.12241

Kaiser, T., Lusardi, A., Menkhoff, L. and Urban, C. (2020), "Financial education affects financial knowledge and downstream behaviors", working paper [WP2020-07], Pension Research Council, Wharton University of Pennsylvania, Pennsylvania, 28 April. https://repository.upenn.edu/cgi/viewcontent.cgi?article=1678&context=prc_papers

Kempson, E., Finney, A. and Poppe, C. (2017), "Financial well-being: a conceptual model and preliminary analysis", available at: www.bristol.ac.uk/media-library/sites/geography/pfrc/ pfrc1705-financial-well-being-conceptual-model.pdf (accessed 15 October 2021).

Lind, T., Ahmed, A., Skagerlund, K., Strömbäck, C., Västfjäll, D. and Tinghög, G. (2020), "Competence, confidence, and gender: The role of objective and subjective financial knowledge in household finance", *Journal of Family and Economic Issues*, Vol. 41 No. 4, pp. 626–638. https://doi.org/10.1007/s10834-020-09678-9

Lusardi, A. and Tufano, P. (2015), "Debt literacy, financial experiences, and overindebtedness", *Journal of Pension Economics and Finance*, Vol. 14 No. 4, pp. 332–368. https://doi.org/10.3386/w14808

McCannon, B. C., Asaad, C. T. and Wilson, M. (2016), "Financial competence, overconfidence, and trusting investments: Results from an experiment. Journal of Economics and Finance", Vol. 40 No. 3, pp. 590–606. https://doi.org/10.1007/s12197-015-9328-4

Muir, K., Hamilton, M., Noone, J.H., Marjolin, A., Salignac, F. and Saunders, P. (2017), "Exploring financial wellbeing in the Australian context". report, Centre for Social Impact & Social Policy Research Centre, University of New South Wales Sydney, Australia, September.

Netemeyer, R. G., Warmath, D., Fernandes, D. and Lynch, J. G. (2018), "How am i doing? Perceived financial well-being, its potential antecedents, and its relation to overall well-being", *Journal of Consumer Research,* Vol. 45 No. 1, pp. 68–89. https://doi.org/10.1093/jcr/ucx109

OECD (Organization for Economic Co-operation and Development). (2015), "National strategies for financial education: OECD/INFE policy handbook", available at: https://www.oecd.org/finance/National-Strategies-Financial-Education-Policy-Handbook.pdf (accessed 28 November 2021).

OECD (Organization for Economic Co-operation and Development). (2016), "OECD/INFE international survey of adult financial literacy competencies", available at: https://www.oecd.org/daf/fin/financial-education/OECD-INFE-International-Survey-of-Adult-Financial-Literacy-Competencies.pdf (accessed 28 November 2021).

OECD (Organization for Economic Co-operation and Development). (2017), "G20/OECD INFE report on adult financial literacy in G20 countries", available at: https://www.oecd.org/daf/fin/financial-education/G20-OECD-INFE-report-adult-financial-literacy-in-G20-countries.pdf (accessed 20 October 2021).

OECD (Organization for Economic Co-operation and Development). (2018), "OECD Data", available at: https://data.oecd.org/netherlands.htm (accessed 25 November 2021).

OECD (Organization for Economic Co-operation and Development). (2019), "OECD better life index", available at: https://www.oecdbetterlifeindex.org/countries/netherlands/ (accessed 18 October 2021).

OECD/INFE (Organization for Economic Co-operation and Development/International Network on Financial Education). (2015), "Toolkit for measuring financial literacy and financial inclusion", available at: https://www.oecd.org/daf/fin/financial-education/2015_OECD_INFE_Toolkit_Measuring_Financial_Literacy.pdf (accessed 25 October 2021).

OECD/INFE (Organization for Economic Co-operation and Development/International Network on Financial Education). (2018), "Toolkit for measuring financial literacy and financial inclusion", available at: https://www.oecd.org/financial/education/2018-INFE-FinLit-Measurement-Toolkit.pdf (accessed 25 October 2021).

Peters, E., Tompkins, M. K., Knoll, M. A. Z., Ardoin, S. P., Shoots-Reinhard, B. and Meara, A. S. (2019), "Despite high objective numeracy, lower numeric confidence relates to worse financial and medical outcomes", *Proceedings of the National Academy of Sciences of the United States of America*, Vol. 116 No. 39, pp. 19386–19391. https://doi.org/10.1073/pnas.1903126116

PWC (Price Waterhouse Coopers). (2018), "Digital intelligence: Choose-your-own-adventure model in financial services", available at: https://www.pwc.com/us/en/industries/financial-services/library/shaping-consumer-behavior.html (accessed 10 October 2021).

Raveendran, J., Soren, J., Ramanathan, V., Sudharshan, R., Mahalanabis, S., Suresh, A. K. and Balaraman, V. (2021), "Behavior science led technology for financial wellness", *CSI Transactions on ICT*, Vol. 9 No. 2, pp. 115–125. https://doi.org/10.1007/s40012-021-00331-w

Riitsalu, L. and Murakas, R. (2019), "Subjective financial knowledge, prudent behaviour and income", *International Journal of Bank Marketing*, Vol. 37 No. 4, pp. 934–950. https://doi.org/10.1108/IJBM-03-2018-0071

Robb, C. A., Babiarz, P., Woodyard, A. and Seay, M. (2015), "Bounded rationality and use of alternative financial services", *Journal of Consumer Affairs*, Vol. 49 No. 2, pp. 407–435. https://doi.org/10.1111/joca.12071

Robb, C.A. and Woodyard, A.S. (2011), "Financial knowledge and best practice behavior", *Journal of Financial Counseling and Planning*, Vol. 22 No. 1, pp. 60–70.

Robb, C. A. and Woodyard, A. S. (2016), "Consideration of financial satisfaction: What consumers know, feel and do from a financial perspective", *Journal of Financial Therapy*, Vol. 7 No. 2, pp. 41–61. https://doi.org/10.4148/1944-9771.1102

Rosen, M.H. and Sade, O. (2017), "When implementing fintech advancement, does financial regulation unintentionally ignore less privileged populations? The investigation of regulatory change, objective and subjective financial literacy", available at: https://papers.ssrn.com/abstract=292 9674 (accessed 12 October 2021).

Shim, S., Xiao, J. J., Barber, B. L. and Lyons, A. C. (2009), "Pathways to life success: A conceptual model of financial well-being for young adults", *Journal of Applied Developmental Psychology*, Vol. 30 No. 6, pp. 708–723. https://doi.org/10.1016/j.appdev.2009.02.003

Statman, M., Thorley, S. and Vorkink, K. (2006), "Investor overconfidence and trading volume", *Review of Financial Studies*, Vol. 19 No. 4, pp. 1531–1565. https://doi.org/10.1093/rfs/hhj032

UNSGSA (United Nations Secretary-General's Special Advocate for Inclusive Finance for Development). (2021), "Financial service providers and financial health", available at: https://www.unsgsa.org/sites/default/files/resources-files/2021-09/Private%20Sector%20Subgroup%20Business%20Case%20for%20Financial%20Health.pdf (accessed 15 September 2021).

Valant, J. (2015), "Improving the financial literacy of European consumers", briefing, European Parliamentary Research Service, European Parliament, Belgium, May, https://www.europarl.europa.eu/RegData/etudes/BRIE/2015/557020/EPRS_BRI(2015)557020_EN.pdf

Van der Cruijsen, C., De Haan, J. and Roerink, R. (2020), "Trust in Financial Institutions: A Survey", working paper [No. 693], De Nederlandsche Bank, the Netherlands, 18 August, http://dx.doi.org/10.2139/ssrn.3677835

Van Dijk, W. W., Van der Werf, M. and Van Dillen, L. F. (2021), "The Psychological Inventory of Financial Scarcity (PIFS): A Psychometric Evaluation", *Manuscript submitted for publication*.

Xia, T., Wang, Z. and Li, K. (2014), "Financial literacy overconfidence and stock market participation", *Social Indicators Research*, Vol. 119 No. 3, pp. 1233–1245. https://doi.org/10.1007/s11205-013-0555-9

Xiao, J. J. (2008), "Applying behavior theories to financial behavior", Xiao, J. J. (Ed.), *Handbook of consumer finance research*, Springer Science + Business Media, Germany, pp. 69–81. https://doi.org/10.1007/978-0-387-75734-6_5

Xiao, J.J., Chen, C. and Sun, L. (2015), "Age differences in consumer financial capability", *International Journal of Consumer Studies*, Vol. 39 No. 4, pp. 387–395, http://dx.doi.org/10.1111/ijcs.12205.

Xiao, J.J., Sorhaindo, B. and Garman, E.T. (2006), "Financial behaviour of consumers in credit counseling", *International Journal of Consumer studies*, Vol. 30 No. 2, pp. 108–121. http://dx.doi.org/10.1111/j.1470-6431.2005.00455.x

Xiao, J. J., Tang, C. and Shim, S. (2009), "Acting for happiness: Financial behavior and life satisfaction of college students", *Social Indicators Research*, Vol. 92 No. 1, pp. 53–68. http://dx.doi.org/10.1007/s11205-008-9288-6

Younas, W., Javed, T., Kalimuthu, K. R., Farooq, M., Khalil-ur-Rehman, F. and Raju, V. (2019), "Impact of self-control, financial literacy and financial behavior on financial well-being", *The Journal of Social Sciences Research*, Vol. 5 No. 1, pp. 211–218.

Chapter 4

The road to financial satisfaction: Testing the paths of knowledge, attitudes, sense of control, and positive financial behaviors

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Being satisfied with one's own overall financial circumstances is an important goal in the financial therapy field (Joo & Grable, 2004). The literature offers no standard way of defining and measuring financial satisfaction, and the term financial satisfaction is often interchangeable with financial well-being, financial wellness, and financial health (Joo & Grable, 2004; Robb & Woodyard, 2016). To prevent confusion, the present study used the term "financial satisfaction" because the measure used addressed the subjective side of the broader construct of financial well-being (for further details see Kempson & Poppe, 2018). The term financial satisfaction generally is described as being happy about and feeling in control of one's financial situation (Joo & Grable, 2004; Robb & Woodyard, 2016), and has implications that reach beyond one's finances. Studies have shown that it is associated with several areas of individuals' well-being and life satisfaction, such as happiness, physical and mental health, labor productivity, consumer choice, and freedom from marital stress (Hansen, 2009; Joo & Grable, 2004; Robb & Woodyard, 2016).

Financial satisfaction has attracted considerable attention from financial practitioners, such as therapists, counselors, and psychologists. Knowing the extent to which concrete modifiable factors improve financial satisfaction, these practitioners can help their clients effectively. Previous research has identified positive financial behaviors that contribute to financial satisfaction, such as active saving and managing credit (Easterlin, 2006; Xiao, Chen, & Chen, 2014). The present study contributes to the literature by drawing attention to the possibility that underlying individual factors could directly or indirectly through financial behaviors improve financial satisfaction as well (Joo & Grable, 2004). By widening the scope from specific financial behaviors, such as active saving and managing credit, to the underlying factors that characterize the individuals who should perform these behaviors, practitioners can broaden their arsenal to improve financial satisfaction. With this perspective

in mind, the central aim of the present study was to shed light on behavior-based paths to financial satisfaction.

Literature review

Determinants of financial satisfaction

Joo and Grable (2004) were among the first to outline a comprehensive theoretical framework of the determinants of financial satisfaction. Their model, which they tested in a small sample of white-collar clerical workers (N = 220), identified financial behaviors as the main predictors of financial satisfaction. They also acknowledged that these financial behaviors may, in turn, be determined by specific individual factors: demographic factors, financial stressors, financial knowledge, and financial attitudes. This framework offers a starting point, but is limited because it was tested on a small and select sample. To improve the generalizability of Joo and Grable's findings, subsequent studies assessed their framework within large nationally representative samples (Garrett & James, 2013; Robb & Woodyard, 2016; Seay et al., 2015; Xiao et al., 2014). However, these more recent studies did not empirically test whether the aforementioned individual factors predicted financial satisfaction via financial behaviors. In the present study, the aim was to further advance the field by testing these indirect relations.

Positive financial behaviors

Individuals can lead better lives by managing their money effectively. The corresponding positive financial behaviors—those behaviors that imply effective financial decisions—benefit both society and the individual (Ameliawati & Setiyani, 2018). From a societal perspective, positive behaviors contribute to financial stability and economic growth (Lusardi & Mitchell, 2014). For individuals, such behaviors have positive implications for

their career, mental and physical health, labor productivity and, especially relevant for the present study, financial satisfaction (Bir, 2014).

To illustrate, individuals who actively save money create a financial buffer that prevents them from getting into problems when they experience a financial setback (Joo & Grable, 2004; Robb & Woodyard, 2016; Xiao et al., 2014). Similarly, individuals who effectively manage their credit know when they can or cannot take loans, which prevents them from becoming over-indebted (Robb & Woodyard, 2016). Another example is that individuals who adjust their spending according to changing conditions protect themselves from spending beyond their financial means (Joo & Grable, 2004). In a similar vein, individuals who keep track of their financial affairs can prevent themselves from spending more money than they really can afford (Joo & Grable, 2004). Likewise, individuals who shop around to obtain better financial deals can spend less money, which allows them to purchase other items they want (Xiao et al., 2014). All these positive financial behaviors help individuals to experience greater satisfaction with their financial situation.

Individual factors underlying positive financial behaviors

The above insights point to specific financial behaviors that can be addressed in interventions and therapies. The arsenal may be broadened, however, if one considers the individual factors that underlie these behaviors. Apart from factors beyond the control of financial practitioners (e.g., gender, age, education, and income; see Hira & Mugenda, 1999; Joo, 1998), the literature has also identified a series of individual factors that can be influenced. Below, three sets of these factors are addressed: (a) individuals' financial knowledge and financial confidence, (b) their future orientation and attitudes toward money, and (c) their spending self-control and perceived behavioral control.

Financial knowledge and financial confidence. To know which positive financial behaviors to perform, individuals benefit from having sufficient financial knowledge. Studies often distinguish between objective and subjective measures of financial knowledge. Objective financial knowledge concerns one's understanding of different areas of financial markets, products, and services (Huston, 2010). Subjective financial knowledge (also termed financial confidence) refers to having self-confidence in managing financial matters and assessing the risks and opportunities associated with these matters (Susilowati, Latifah, & Jariyah, 2017). In the present study, subjective financial knowledge and financial confidence were used interchangeably.

Both types of knowledge can increase financial satisfaction directly (Joo & Grable, 2004; Xiao et al., 2014), but also via specific positive financial behaviors. To illustrate, as accurate knowledge about financial matters can help individuals understand the financial landscape better, this is related to more positive financial behaviors such as active saving and not borrowing for the short term. Such behaviors, in turn, may help individuals to feel more financially satisfied (Arifin, 2018; Falahati, Sabri, & Paim, 2012). The relation is not always positive, however. For instance, Mugenda, Hira, & Fanslow (1990) explained that individuals who are more financially knowledgeable strive to enhance their financial situation because they are aware that there is room for improvement and therefore are less financially satisfied. Conversely, individuals who are less financially knowledgeable may not realize that their situation is relatively weak. These individuals may report greater financial satisfaction because ignorance can be bliss.

Prior work about financial confidence likewise found that it directly predicts financial satisfaction (De Bassa Scheresberg, 2013; Henager & Cude, 2016; Mudzingiri, Mwamba, & Keyser, 2018), even stronger than objective knowledge does (Xiao, Tang, Serido, & Shim, 2011). For example, individuals with more financial confidence may be convinced of their

ability to handle their financial situation, thus leading them to experience greater financial satisfaction. Again, this impact can be both direct and indirect via certain positive behaviors. For instance, this may translate into positive financial behaviors, such as working toward financial goals and managing credit. As a result, they may experience greater financial satisfaction. It should be noted, however, that limited studies investigated and found that the relationship between financial confidence and financial satisfaction indeed runs via positive financial behaviors (Atlas, Lu, Micu, & Porto, 2019; Joo & Grable, 2004). This can be ascribed to the fact that individuals do not always accurately assess their actual financial knowledge as discussed earlier (Courchane & Zorn, 2005), which therefore results in over-confidence or under-confidence. Since financial knowledge and financial confidence thus may have differential impacts on financial satisfaction, both factors were addressed in the present study.

Future orientation and attitude toward money. Individuals can also benefit from having an attitude that prevents them from worrying about (future) shortage of money (Kirbiš, Vehovec, & Galić, 2017). Positive future orientation, described as individuals' attitudes toward planning and providing for the future (Metcalf & Zimbardo, 2016),[30] is such an attitude. This leads to a more optimistic view of the future, which might allow individuals to experience greater financial satisfaction. This link may be direct, but can also run via positive behaviors. One can argue that individuals who have more future-oriented mindsets tend to control their (daily) spending better and have more financial room to build a buffer against financial shocks. Indeed, previous work has found a positive link between future orientation and several positive financial behaviors (Howlett, Kees, & Kemp, 2008; Rutledge & Deshpande, 2014), and between future orientation and financial satisfaction (Nyström &

[30]Future orientation has been operationalized in several ways and the terms used to describe it have been usually "financial time perspective", "time orientation", or "future orientation" (e.g., Rutledge & Deshpande, 2014). These terms imply the same.

Romberg, 2017). It has not, however, been studied yet whether future orientation is related to financial satisfaction indirectly via positive financial behaviors.

Attitude toward money also plays a role with regard to financial satisfaction because it involves the frame of reference that one uses to assess and make financial decisions (Henchoz, Coste, & Wernli, 2019). For example, having a careful attitude toward money may positively affect financial satisfaction because individuals recognize that they have reached or are working on reaching a stable financial situation. Earlier studies have reported that attitude toward money is a significant contributor to financial satisfaction (Dowling, Corney, & Hoiles, 2009). The impact may be direct, but might also run via positive financial behaviors. For instance, individuals who have a careful attitude toward money may keep track of their money, save their money for future use, and shop around to obtain better deals. These positive behaviors may help individuals to combat unpleasant financial surprises and avoid financial difficulties, thereby allowing them to experience greater financial satisfaction. So far, no studies have provided evidence on whether or not attitude toward money contributes to financial satisfaction via positive financial behaviors.

Spending self-control and perceived behavioral control. One can have sufficient knowledge and an appropriate attitude, but still feel tempted to spend. Spending self-control, often defined as one's ability to curb spending impulses (Haws, Bearden, & Nenkov, 2012), can then help to keep one focused on performing positive financial behaviors, such as adjusting spending and shopping around. These behaviors, in turn, may lead to greater financial satisfaction. Previous research indicated that financial satisfaction is indeed related to spending self-control (Hirvonen, 2018; Rha, Montalto, & Hanna, 2006; Van Rooij, Lusardi, & Alessie, 2012). Nonetheless, the empirical question remains whether or not this relationship runs via positive financial behaviors. The relationship between spending self-

control and financial satisfaction can also be influenced by personality traits. For example, individuals who are 'happy-go-lucky' (Thompson, Prendergast, & Dericks, 2019) could have both less spending self-control and greater financial satisfaction (Wiese et al., 2018).

Similarly, perceived behavioral control—the perceived ease or difficulty to enact a behavior (Ajzen, 1985)—may play a role in improving financial satisfaction. For example, when individuals believe that they can execute whatever financial behavior they want, this may enable them to experience greater financial satisfaction. Perceived behavioral control, however, can also promote positive financial behaviors such as working toward financial goals and via these behaviors contribute to financial satisfaction. To date, the role of perceived behavioral control has been examined for some positive financial behaviors, such as sound borrowing, achieving financial goals, and managing money (Chudry, Foxall, & Pallister, 2011; Lajuni, Abdullah, Bujang, & Yacob, 2018), but has not yet been linked to financial satisfaction.

The present study

The present study argued that the aforementioned individual factors (i.e., financial knowledge, financial confidence, future orientation, attitude toward money, spending self-control, and perceived behavioral control), directly and indirectly contribute to financial satisfaction via positive financial behaviors. If these factors impact financial satisfaction immediately by promoting positive behaviors, practitioners' tools will be enhanced. Financial practitioners can help improve financial satisfaction by influencing positive financial behaviors (e.g., Falahati et al., 2012) and the factors that underlie these behaviors. Figure 1 presents the conceptual model of the present study.

The contribution of this study to the financial satisfaction literature is threefold. First, using an adapted version of Joo and Grable's (2004) theoretical framework, it examined

whether financial satisfaction can be predicted by knowledge factors (i.e., financial knowledge and financial confidence), attitudinal factors (i.e., future orientation and attitude toward money), and sense of control factors (i.e., spending self-control and perceived behavioral control). Previous research has often used risk tolerance as the only attitudinal factor and has not included factors relating to sense of control (Joo & Grable, 2004; Robb & Woodyard, 2016). Including this array of individual factors simultaneously can provide a better understanding of the determinants of clients' financial satisfaction. Second, this study used a large nationally representative sample to examine the relative effects, both direct and indirect, of the aforementioned individual factors on financial satisfaction. Earlier research either accounted for both direct and indirect effects using comparatively small samples (Joo & Grable, 2004) or when using large representative samples tested only direct effects (e.g., Garrett & James, 2013; Robb & Woodyard, 2016). Thus, it was difficult to identify how underlying individual factors can increase financial satisfaction via their impact on positive financial behaviors. Third, by addressing both the direct and indirect effects, the present study could help practitioners select the most promising factors to shape their therapeutic interventions and develop new educational programs for their clients.

It was hypothesized that individual financial knowledge and financial confidence, future orientation and attitude toward money, and spending self-control and perceived behavioral control are related to positive financial behaviors, and that, in turn, these behaviors are associated with financial satisfaction (H1 in Figure 1). The present study also assessed whether this indirect relationship varied depending on the type of financial behavior. It was furthermore hypothesized that all of the individual factors are directly associated with financial satisfaction (H2 in Figure 1). Demographic factors were treated as control variables, since they cannot be changed through interventions and therapies.

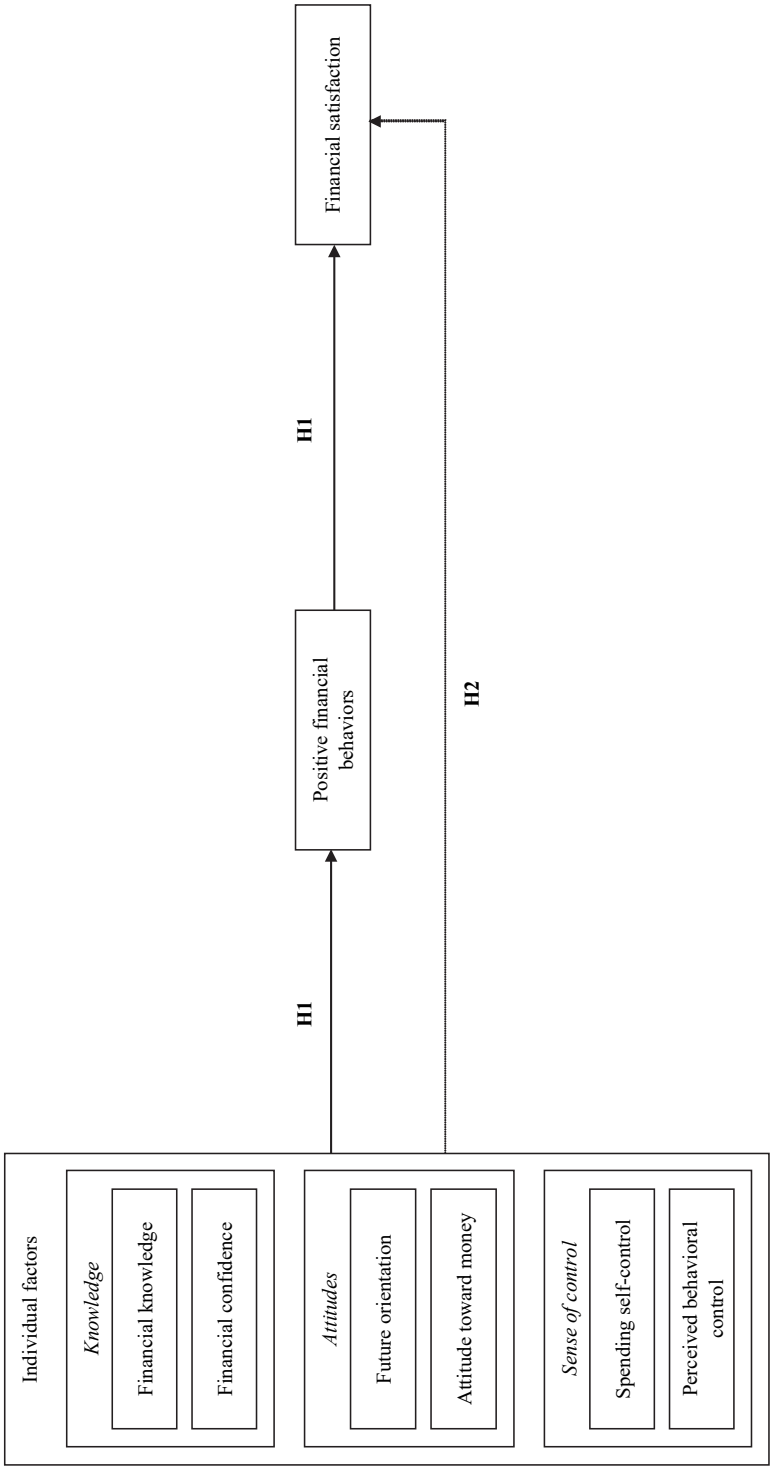

Figure 1. The conceptual model of the present study. Adapted from Joo and Grable's (2004) theoretical framework of financial satisfaction.

Methods

Data and sample characteristics

Publicly available data from the Financial Capability Survey commissioned by the Money Advice Service[31] (MAS, 2018b) were used. The data were gathered via a mixed mode approach (online and face-to-face) from April to June 2018 and weighted to be representative of the UK adult population (see MAS, 2018b, for further details).

From the drawn sample of 5,974 adults (4,385 working age and 1,589 retirees), only data from respondents who were working-age (i.e., 18 and 64 years), completed the survey online, and who indicated that they—personally or jointly—managed their household's money day-to-day were included in the present study.[32] This resulted in a sample of 2,133 respondents (54.6% females and 45.4% males, M_{age} = 40.01 years, SD_{age} = 12.67). The mean effective household income was £22,364 (*SD* = £16,211). Furthermore, 44.4% completed less than higher education, 33.2% completed up to the first-degree qualification, and 22.4% completed university-degree qualification.

[31]The MAS is a governmental body that was established under the Financial Services Act 2010 to provide free and impartial financial education and advice to consumers in the UK. As of January 2019, it was merged into the Money and Pensions Service and is now the largest funder of debt advice in the UK.

[32]This specific subsample was selected for three reasons. First, there may be differences between the working-age and the retired respondents regarding the individual factors that influence their financial well-being (see MAS, 2018a). Given that this could also be the case for financial satisfaction (Hansen, Slagsvold, & Moum, 2008) and that the group of working-age respondents was much larger than the group of respondents who were retired, the working-age group was selected. Second, the interview method may influence how respondents answer the questions. Research documented that face-to-face surveys are more susceptible to socially desirable responses than online surveys (Heerwegh, 2009). Therefore, the online working-age group (*n* = 3,385) was selected. Third, from this group those respondents who managed their household's money were selected because the variables included in the present study were mostly relevant to them. Hence, they could benefit the most from our findings and resulting implications and conclusions.

Measures

Financial satisfaction. Financial satisfaction was assessed using the question: "How satisfied are you with your overall financial circumstances?" (1 = not at all satisfied to 11 = completely satisfied).[33] A higher score indicated greater financial satisfaction.

Positive financial behaviors. The positive financial behaviors included in the present study were: (a) not borrowing for the short term, (b) active saving, (c) working toward goals, (d) adjusting spending, (e) managing credit use, (f) keeping track, and (g) shopping around.

Not borrowing for the short term was assessed using four items, concerning the extent to which respondents: (a) borrowed money to pay off debts, (b) borrowed money from family or friends because they ran out of money, (c) overdrew on their current account, and (d) used a credit card, overdraft or borrowed money to buy food or pay bills because they ran short of money (1 = very often to 5 = never). Respondents' answers to the four items were averaged to yield an index of not borrowing for the short term. A higher mean indicated not borrowing for the short term (Cronbach's $\alpha = 0.87$).

Active saving was assessed using the question: "Which of these best describes how often you save money?" (1 = every month, 2 = most months, 3 = some months, but not others, 4 = rarely/never). Respondents' answers to this question were reverse scored so that a higher score indicated more active saving.

Working toward goals was assessed using two items, concerning whether respondents: (a) had a plan for their financial goals for the next five years (1 = clear plan, 2 = rough plan, 3 = not much of a plan, 4 = no plan at all, 5 = no financial goals) and (b) had done something to achieve their financial goals for the next five years (1 = great deal, 2 = fair amount, 3 = not very much, 4 = nothing at all, 5 = no financial goals). Respondents' answers

[33]While some researchers prefer to use single-item measures, others favor multiple-item measures (Joo & Grable, 2004). To date, it has been shown that both measures offer valid and reliable results, although single-item measures were used mainly for large nationally representative samples (Robb & Woodyard, 2016).

to the two items were reverse scored and averaged to yield an index of working toward goals. A higher mean indicated working more toward goals (Pearson's $r = 0.81$).

Adjusting spending was assessed using three items, concerning whether respondents: (a) planned their spending to cover months where they expected money would be tighter (1 = does not sound like me at all to 11 = sounds a lot like me), (b) adjusted the amount of money they spent on non-essentials when their life changed (1 = does not sound like me at all to 11 = sounds a lot like me), and (c) changed their spending as a result of keeping track of their (household) income and expenditure (1 = great deal, 2 = fair amount, 3 = not very much, 4 = not at all). Respondents' answers to the third item were reverse scored and recoded to an eleven-point scale.[34] Subsequently, their answers to the three items were averaged to yield an index of adjusting spending. A higher mean indicated adjusting spending more ($\alpha = 0.66$).

Managing credit use was assessed using the question: "How do you generally handle paying your bill each month for your credit card(s) or store card(s)?" (1 = always pay only the minimum to 5 = always pay full). A higher score indicated managing credit use better.

Keeping track was assessed using the question: "How often do you normally check how much money is in your current account?" (1 = every day to 6 = never). Respondents' answers to this question were reverse scored so that a higher score indicated keeping more track of spending.

Shopping around was assessed using five items, concerning whether respondents shopped around for better deals on: (a) their phone, internet, or TV packages, (b) utilities, (c) bank or savings accounts, (d) credit cards, and (e) car or home insurance (1 = not at all, 2 = not very much, 3 = fair amount, 4 = great deal). Respondents' answers to the five items were averaged to yield an index of shopping around. A higher mean indicated shopping around more for better deals ($\alpha = 0.84$).

[34]To convert a 4-point to an 11-point scale, the following formula was used:
(11 - 1) * (X - 1) / (4 - 1) + 1 = 10 * (X - 1) / 3 + 1 = (10/3) * X - (10/3) + 1 = (10/3) * X - (7/3). As intended, X = 1 results in 1, and X = 4 results in 11 (see IBM, 2018, for further details).

Individual factors underlying positive financial behaviors. The following individual factors were included in the present study: (a) financial knowledge and financial confidence, (b) future orientation and attitude toward money, and (c) spending self-control and perceived behavioral control.

Financial knowledge[35] was assessed using three questions:

1. Suppose you put £100 into a savings account with a guaranteed interest rate of 2% per year. You don't make any further payments into this account and you don't withdraw any money. How much would be in the account at the end of the first year, once the interest payment is made? This question was open-ended (Correct answer: £102).
2. And, how much would be in the account at the end of five years (remembering there are no fees or tax deductions). Would it be more than £110, exactly £110, less than £110, or it is impossible to tell from the information given? (Correct answer: more than £110).
3. If the inflation rate is 5% and the interest rate you get on your savings is 3%, will your savings have more, less or the same amount of buying power in a year's time? (Correct answer: less)

For each correct answer, respondents were assigned one point and therefore their financial knowledge scores could range from zero to three. A higher sum indicated greater financial knowledge.

Financial confidence was assessed using five items, concerning the extent to which respondents felt confident about: (a) managing their money, (b) making decisions about financial products and services, (c) working with numbers when they need to in everyday life,

[35]Although financial knowledge included only three specific items, it is the common UK approach to measure respondents' understanding of key financial concepts and accompanying mathematical calculations (MAS, 2018a) and is comparable in content and construction to the widely used 'Big Three' questions (Lusardi & Mitchell, 2011).

(d) planning for their financial future, and (e) protecting themselves from financial scams (1 = not at all confident to 11 = very confident). Respondents' answers to the five items were averaged to yield an index of financial confidence. A higher mean indicated more financial confidence ($\alpha = 0.89$).

Future orientation was assessed using the statement: "When it comes to money, I focus on the long term" (1 = does not sound like me at all to 11 = sounds a lot like me). A higher score indicated a more future-oriented mindset.

Attitude toward money was assessed using four items, concerning the extent to which respondents, when thinking about their (household) finances, thought it was important to: (a) save money for a rainy day, (b) keep track of income and expenditure, (c) put aside money for their retirement, and (d) shop around in order to make their money go further (1 = very important to 5 = very unimportant). Respondents' answers to the four items were reverse scored and then averaged to yield an index of attitude toward money. A higher mean indicated a more careful attitude toward money ($\alpha = 0.83$).

Spending self-control was assessed using four items, concerning whether respondents: (a) often bought things on impulse, (b) felt under pressure to spend like their friends even when they could not afford it, (c) ran short of money because they overspent, and (d) tended to buy things even when they could not really afford them (1 = does not sound like me at all to 11 = sounds a lot like me). Respondents' answers to the four items were reverse scored and then averaged to yield an index of spending self-control. A higher mean indicated more spending self-control ($\alpha = .91$).

Perceived behavioral control was assessed using the statement: "Nothing I do will make much difference to my financial situation" (1 = strongly agree to 5 = strongly disagree). A higher score indicated more perceived behavioral control.

Control variables. The demographic control variables included in the present study were gender (male or female), age (continuous: ranging from 18 to 64 years old), education (three categories: less than higher education, up to first-degree, and university-degree), and effective income (continuous: ranging from £850 to £79,550).[36] For the analyses, the last category of education was used as the reference group.

Data analysis

Missing data. Little's (1988) test of missing values yielded a statistically significant result, χ^2 = 21,601.70, *df* = 17,971, $p < .001$, indicating that the data were not missing completely at random. Thus, as recommended by Van Ginkel, et al. (2019), multiple imputations with five implicate datasets were used for the analysis.

Path analysis. Using a path analysis enabled us to test the compatibility of our theoretical mediation model (see Figure 1) with the MAS dataset (Stage, Carter, & Nora, 2004). A path analysis identifies the indirect, direct, and total effects. The indirect effects regard the contribution of the independent variables to the dependent variable that operates via the intermediate variable. The direct effects refer to the contribution of the independent variables to the dependent variable, keeping constant the other variables in the model. The total effects concern the sum of indirect and direct effects. All effects are standardized coefficients estimated with maximum likelihood (Jeon, 2015).

All analyses of the present study were performed with the jAMM module of the open-source jamovi statistical platform (Gallucci, 2019; The jamovi project, 2019), based on lavaan R package (Rosseel, 2012). The path analysis was built using the six individual

[36]Effective income concerns the annual gross household income divided by the square root of the household's size (Buhmann & Rainwater, 1988). Income (before taxes) had 17 banded levels ranging from under £4,500 to £100,000 or more. It was estimated by using the midpoint of every banded level. As the lowest banded level had no lower limit, it was assumed that respondents' income could start at £0. As the highest banded level had no upper limit, the same range (£24,999) as for the two penultimate income brackets was used.

variables underlying positive financial behaviors as the independent variables, the seven positive financial behaviors as the intermediate variables, and financial satisfaction as the dependent variable. The path analysis further included gender, age, education, and effective income as the control variables (see MAS, 2018a, for the original dataset). If a *significant* indirect relation was found, thus supporting Hypothesis 1, a further analysis of the component relations was performed. This was done to explore the relations between the individual factor and the financial behavior in question and between that behavior and financial satisfaction.

Results

Descriptive and correlation results

Appendix A presents the descriptive statistics and correlation coefficients of the variables included in the present study. Results of a correlation analysis showed that all included individual variables were significantly related to financial satisfaction ($p < .001$), except for not borrowing for the short term ($r = 0.01$, $p = .640$) and financial knowledge ($r = 0.02$, $p = .331$). Results also showed that, among the independent variables, no multicollinearity issues were identified (Collis & Hussey, 2009; Dormann et al., 2012). To assess the overall impact of the included individual variables, a path analysis was performed.

Path analysis results

Appendices B-E report the standardized coefficients obtained from the path analysis when controlling for gender, age, education, and effective income.

Indirect effects on financial satisfaction. Results showed that financial knowledge had a positive indirect relation with financial satisfaction via managing credit use ($\beta = .01$, $z = 3.21$, $p = .001$) (see Appendix B). A subsequent analysis of the component effects revealed

that financial knowledge had a positive association with managing credit use (β = 0.13, z = 6.08, p < .001), which, in turn, had a positive relationship with financial satisfaction (β = 0.07, z = 3.77, p < .001) (see Appendix E). Financial confidence had a positive indirect relation with financial satisfaction via active saving (β = 0.02, z = 4.71, p < .001) and via working toward goals (β = 0.02, z = 3.65, p < .001), but a negative indirect relation via adjusting spending (β = -0.01, z = 3.07, p = .002) (see Appendix B). A subsequent analysis of the component effects revealed that financial confidence had positive associations with both active saving (β = 0.16, z = 6.29, p < .001) and working toward goals (β = 0.19, z = 7.64, p < .001), which, in turn, had positive relationships with financial satisfaction (β = 0.16, z = 7.93, p < .001; β = 0.09, z = 4.19, p < .001, respectively) (see Appendix E). Moreover, financial confidence had a positive association with adjusting spending (β = 0.17, z = 7.24, p < .001), which, in turn, had a negative relationship with financial satisfaction (β = -0.07, z = 3.40, p < .001) (see Appendix E).

Future orientation had a positive indirect relation with financial satisfaction via active saving (β = 0.03, z = 6.15, p < .001), via working toward goals (β = 0.03, z = 4.01, p < .001), and via keeping track (β = 0.01, z = 3.20, p = .001), but a negative indirect relation via adjusting spending (β = -0.02, z = 3.27, p = .001) (see Appendix B). A subsequent analysis of the component effects revealed that future orientation had positive associations with active saving (β = 0.22, z = 9.17, p < .001) and working toward goals (β = 0.32, z = 14.44, p < .001), which, in turn, had positive relationships with financial satisfaction (β = 0.16, z = 7.93, p < .001; β = 0.09, z = 4.19, p < .001, respectively) (see Appendix E). Additionally, future orientation had a positive association with adjusting spending (β = 0.32, z = 12.06, p < .001), which, in turn, had a negative relationship with financial satisfaction (β = -0.07, z = 3.40, p < .001) (see Appendix E). Furthermore, future orientation had a negative association with keeping track (β = -0.11, z = 4.91, p < .001), which, in turn, had a negative relationship with

financial satisfaction (β = -0.07, z = 4.66, $p < .001$) (see Appendix E). Attitude toward money had a positive indirect relation with financial satisfaction via active saving (β = 0.01, z = 3.53, $p < .001$) and via working toward goals (β = 0.01, z = 3.14, $p = .002$), but a negative indirect relation via adjusting spending (β = -0.01, z = 3.13, $p = .002$) and via keeping track (β = -0.005, z = 2.46, $p = .014$) (see Appendix B). A subsequent analysis of the component effects revealed that attitude toward money had positive associations with both active saving (β = 0.08, z = 3.97, $p < .001$) and working toward goals (β = 0.08, z = 4.79, $p < .001$), which, in turn, had positive relationships with financial satisfaction (β = 0.16, z = 7.93, $p < .001$; β = 0.09, z = 4.19, $p < .001$, respectively) (see Appendix E). Besides, attitude toward money had positive associations with both adjusting spending (β = 0.20, z = 9.14, $p < .001$) and keeping track (β = 0.06, z = 2.84, $p = .005$), which, in turn, had negative relationships with financial satisfaction (β = -0.07, z = 3.40, $p < .001$; β = -0.07, z = 4.66, $p < .001$, respectively) (see Appendix E).

Spending self-control had a positive indirect relation with financial satisfaction via not borrowing for the short term (β = 0.02, z = 2.07, $p = .039$), via adjusting spending (β = 0.01, z = 2.71, $p = .007$), and via managing credit use (β = 0.01, z = 3.24, $p = .001$), but a negative indirect relation via active saving (β = -0.01, z = 2.99, $p = .003$) and via working toward goals (β = -0.01, z = 3.25, $p = .001$) (see Appendix B). A subsequent analysis of the component effects revealed that spending self-control had positive associations with not borrowing for the short term (β = 0.49, z = 25.36, $p < .001$) and managing credit use (β = 0.16, z = 7.15, $p < .001$), which, in turn, had positive relationships with financial satisfaction (β = 0.05, z = 2.07, $p = .038$; β = 0.07, z = 3.77, $p < .001$, respectively) (see Appendix E). In addition, spending self-control had a negative association with both active saving (β = -0.07, z = 3.24, $p = .001$) and working toward goals (β = -0.13, z = 5.84, $p < .001$) which, in turn, had positive relationships with financial satisfaction (β = 0.16, z = 7.93, $p < .001$; β = 0.09, z

= 4.19, $p < .001$, respectively) (see Appendix E). Moreover, spending self-control had a negative association with adjusting spending (β = -0.12, z = 5.16, $p < .001$), which, in turn, had a negative relationship with financial satisfaction (β = -0.07, z = 3.40, $p < .001$) (see Appendix E). Perceived behavioral control had a positive indirect relation with financial satisfaction via not borrowing for the short term (β = 0.01, z = 2.06, $p = .039$), via active saving (β = 0.02, z = 3.80, $p < 0.001$), via working toward goals (β = 0.01, z = 2.48, $p = .013$), via adjusting spending (β = 0.01, z = 2.77, $p = .006$), and via managing credit use (β = 0.01, z = 3.49, $p < .001$) (see Appendix B). A subsequent analysis of the component effects revealed that perceived behavioral control had positive associations with not borrowing for the short term (β = 0.22, z = 12.07, $p < .001$), active saving (β = 0.10, z = 4.55, $p < .001$), working toward goals (β = 0.07, z = 3.24, $p = .001$), and managing credit use (β = 0.18, z = 8.37, $p < 0.001$), which, in turn, had positive relationships with financial satisfaction (β = 0.05, z = 2.07, $p = .038$; β = 0.16, z = 7.93, $p < .001$; β = 0.09, z = 4.19, $p < 0.001$; β = 0.07, z = 3.77, $p < .001$, respectively) (see Appendix E). Additionally, perceived behavioral control had a negative association with adjusting spending (β = -0.11, z = 5.28, $p < 0.001$), which, in turn, had a negative relationship with financial satisfaction (β = -0.07, z = 3.40, $p < .001$) (see Appendix E).

Thus, all individual factors were related to one or more positive financial behaviors which, in turn, were associated with financial satisfaction, providing support for Hypothesis 1. The individual factors with the greatest indirect impact on financial satisfaction were: perceived behavioral control (sum of indirect effects = 0.05), future orientation (sum of indirect effects = 0.05), and financial confidence (sum of indirect effects = 0.04). It is also worth noting that none of the individual factors were related to financial satisfaction via shopping around. Also important to mention is that financial confidence, future orientation, and attitude toward money had a positive impact on adjusting spending, which, in turn, had a

negative impact on financial satisfaction. Similarly, attitude toward money had a positive impact on keeping track, which, in turn, had a negative impact on financial satisfaction. On the other hand, both spending self-control and perceived behavioral control had a negative impact on adjusting spending, which, in turn, also had a negative impact on financial satisfaction. Likewise, future orientation had a negative impact on keeping track, which, in turn, also had a negative impact on financial satisfaction.

Direct effects on financial satisfaction. Results showed that financial confidence ($\beta = 0.42$, $z = 19.12$, $p < .001$), future orientation ($\beta = 0.13$, $z = 5.78$, $p < .001$), and perceived behavioral control ($\beta = 0.06$, $z = 3.07$, $p = .002$) had direct positive relations with financial satisfaction (see Appendix C). By contrast, spending self-control ($\beta = -0.16$, $z = 6.81$, $p < .001$) and financial knowledge ($\beta = -0.08$, $z = 4.71$, $p < .001$) were shown to have direct negative relations with financial satisfaction. Whereas the indirect relations of attitude toward money with financial satisfaction were significant, this factor did not have a direct relation with financial satisfaction ($\beta = -0.02$, $z = 1.35$, $p = .176$).

Thus, all individual factors except for attitude toward money had a direct relation with financial satisfaction, providing (at least) partial support for Hypothesis 2. The individual factor with the greatest direct impact on financial satisfaction was: financial confidence.

Total (indirect plus direct) effects on financial satisfaction. Results showed that financial confidence was the single strongest positive predictor of financial satisfaction ($\beta = 0.46$, $z = 24.19$, $p < .001$), followed by future orientation ($\beta = 0.18$, $z = 10.12$, $p < .001$) and perceived behavioral control ($\beta = 0.11$, $z = 6.22$, $p < .001$) (see Appendix D). Spending self-control ($\beta = -0.14$, $z = 7.59$, $p < .001$) and financial knowledge ($\beta = -0.06$, $z = 3.48$, $p < .001$),

however, were negative predictors of financial satisfaction. Attitude toward money was not a significant predictor of financial satisfaction (β = -0.02, z = 0.99, p = .323).

Of the demographic control variables, effective income was strongly and positively related to financial satisfaction (β = 0.18, z = 10.69, p < .001), indicating that respondents who had higher effective incomes reported greater financial satisfaction. Regarding education, respondents who had up to first-degree qualification reported greater financial satisfaction relative to those who had university-degree qualification (β = 0.09, z = 4.30, p < .001), whereas the opposite held for those who had less than higher education (β = -0.08, z = 3.75, p < .001).

Discussion

It is well established that positive financial behaviors, such as active saving and managing credit, are associated with financial satisfaction (e.g., Robb & Woodyard, 2016), but less clear is what individual factors facilitate such behaviors. By broadening the scope from specific behaviors to their underlying factors, practitioners have a broader number of factors to consider when working on financial satisfaction. In the present study, therefore, the focus was on whether such underlying individual factors are related to financial satisfaction directly or indirectly via the positive behaviors. This hypothesis was tested using an adapted version of Joo and Grable's (2004) framework within a large representative British working-age sample (MAS, 2018a). The individual factors included in the present study were people's financial knowledge and financial confidence, their future orientation and attitude toward money, and their spending self-control and perceived behavioral control.

Summary of findings and implications for financial practitioners

Results indicated that all individual factors were associated with financial satisfaction via one or more positive financial behaviors. Perceived behavioral control, future orientation, and financial confidence were the strongest indirect predictors of financial satisfaction. Furthermore, all individual factors except for attitude toward money had direct associations with financial satisfaction. Financial confidence was the single strongest direct predictor of financial satisfaction. A further discussion of the results for knowledge, attitudinal, and sense of control factors follows.

Financial confidence had the single strongest overall positive relationship with financial satisfaction and thus deserves primary attention. This finding echoes previous research (e.g., Joo & Grable, 2004) and adds to it by using a multiple-item measure, which more accurately represents the construct of financial confidence. It also underscores a need for practitioners to pay attention to clients' confidence in financial matters, as also recommended by other researchers (e.g., Robb & Woodyard, 2016). Financial knowledge had a negative direct relation but a positive indirect relation with financial satisfaction. It may well be the case that individuals who are more knowledgeable realize that their financial situation has room for improvement and therefore experience lower financial satisfaction (Mugenda et al., 1990). Yet, if individuals can use their knowledge to transform their financial behavior in a positive way, this may benefit their financial satisfaction (Arifin, 2018). This finding contributes to the literature by suggesting that while knowledge could reduce financial satisfaction, it could also increase satisfaction by facilitating positive behaviors. Nonetheless, this finding should be interpreted with caution due to the brief, restricted measure used and the fact that earlier studies have indicated that knowledge only has a limited impact on actual behavior (Simonse, Van der Werf, & Wilmink, 2017).

Future orientation had an overall positive link to financial satisfaction. This result contributes to the limited research available on the positive relation between these variables, and suggests that if financial therapy applications help individuals to realize the importance of considering their financial future; this might benefit their financial satisfaction. Attitude toward money had significant positive indirect relations with financial satisfaction. This could indicate that having a more careful attitude toward money does not necessarily mean that individuals really, for example, put money aside for future use as a protection against financial shocks. Therefore, the way individuals may reap the benefits from such an attitude is if they translate it into actual concrete positive behaviors that may benefit their financial satisfaction.

Spending self-control had a negative direct relation with financial satisfaction, which is inconsistent with previous research that has shown a positive relationship between spending self-control and financial satisfaction (e.g., Hirvonen, 2018). It could be that individuals with more self-control restrict themselves from purchasing items they really want. While this benefits their financial security, this may lower their financial satisfaction because they cannot enjoy life, as they would want to. The present study also showed that spending self-control was negatively related to financial satisfaction via active saving and working toward goals. A factor to consider would be individuals' personality traits. For example, individuals who are 'happy-go-lucky' (Thompson et al., 2019) could have less spending self-control while, at the same time, experience greater financial satisfaction (Wiese et al., 2018). Future research is encouraged to examine this issue further. Perceived behavioral control had an overall positive contribution to financial satisfaction. To our knowledge, this finding is the first to show a positive association between these variables. It suggests that practitioners can help clients build their sense of control over their financial behavior as a way to improve

clients' satisfaction. This finding may also encourage more research on this topic using other socioeconomic contexts.

There are two exceptions to the aforementioned relationships. The first exception is that financial confidence, future orientation, and attitude toward money had negative indirect associations with financial satisfaction via adjusting spending, and attitude toward money also via keeping track. These negative relations stemmed from the relation between the two financial behaviors and financial satisfaction. Studies have shown that positive financial behaviors are positively related to financial satisfaction (e.g., Robb & Woodyard, 2016); the present findings broaden the literature by suggesting that this might not be the case for all positive financial behaviors. Some of these behaviors (adjusting spending and keeping track) are painful. Another factor to consider would be financial problems, as individuals with such problems are forced to adjust their spending and check their finances frequently (Madern, 2015). Future research could test whether financial problems moderate the relation between financial behaviors and satisfaction. If practitioners can help their clients realize that some positive behaviors are painful in the short run but beneficial in the long run, clients could view their (future) financial situation in a more positive light. In this regard, practitioners could guide clients to identify when to perform such behaviors. After all, these behaviors are not positive by all means. For instance, if individuals never spend money on items they want or constantly keep track of finances, this could lead to rumination and stress, thus negatively affecting their financial satisfaction.

The second exception is that perceived behavioral control and spending self-control had negative indirect associations with financial satisfaction via adjusting spending and future orientation via keeping track. These negative relationships stem from the association between the two financial behaviors and financial satisfaction, as discussed above, and the relationship between the individual factors and those behaviors. For instance, individuals

with more spending self-control or more perceived behavioral control may realize that they have sufficient control of their financial situation and therefore perform less adjusting spending. Likewise, individuals with more future-oriented mindsets may realize that they are already considering their financial future and thus display less keeping track.

Surprisingly, none of the individual factors were associated with financial satisfaction via shopping around. The component effects showed that some factors had an association with shopping around, but this behavior did not predict financial satisfaction (see Appendix E). This could indicate that individuals who shop around experience some immediate joy when they pay for the deal, but this joy may be too specific to impact financial satisfaction. Moreover, it could be that shopping around is not a pleasant task, thus offsetting the immediate joy. Alternatively, it might be that some individuals need to shop around, but this task is taxing on their time or energy. This finding reiterates the role that practitioners play in helping their clients comprehend that some behaviors could have benefits for their financial situation, but only in the long run. For example, shopping around could lead individuals to have more financial room to reach their future goals that may benefit their long-term financial satisfaction.

Potential limitations and directions for future research

Limitations of the present study warrant consideration. First, this study's correlational nature prevents us from drawing definite causal conclusions from the tested relationships. In future research, the causal effects could be determined, for example, through longitudinal studies (e.g., Hershfield et al., 2011; Kalwij et al., 2019). Second, the present study used seven positive financial behaviors that were self-reported. In future studies, the actual financial behaviors could be assessed, for instance, by requesting individuals to provide their financial statements or by observing their actual bank account data (e.g., Gamble, Boyle, Yu,

& Bennett, 2015). Gathering this financial information, however, may be difficult because of confidentiality reasons. Third, the financial knowledge measure covered three financial aspects. In the future, research should use a more comprehensive measure of objective financial knowledge.

Conclusions

Financial satisfaction is a priority in the financial therapy field as it is associated with both life satisfaction and general well-being (e.g., Hansen, 2009). Financial therapy practitioners tend to combine financial planning services with mental health treatment, meaning that their clients process feelings, experiences, and beliefs about money while working on plans to reach their goals (e.g., retirement, savings, and investments). Hence, practitioners must know what factors improve financial satisfaction to help their clients effectively. The present study expands practitioners' understanding by showing that financial satisfaction is related to individual factors that underlie positive financial behaviors.

In line with the recommendation of other researchers (e.g., Robb & Woodyard, 2016) and the current approach of practitioners, financial confidence seems to be the most promising individual factor to improve financial satisfaction. Practitioners may also wish to pay attention to perceived behavioral control and future orientation. Regarding the indirect impact of the three aforementioned promising individual factors, it may be useful for practitioners to help their clients realize that some financial behaviors (e.g., adjusting spending and keeping track) could be painful in the short-term but contribute to financial satisfaction in the long run. Furthermore, practitioners are well-advised to help their clients identify the moments when it could be beneficial for them to perform such financial behaviors. The present study provides new means of therapies and interventions. The next step, then, would be to test the effectiveness of such therapies and interventions. Doing so

enables practitioners to continue to learn, grow, and establish high-quality support for their clients' road to financial satisfaction.

References

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl & J. Beckman (Eds.), *Action-control: From cognition to behavior* (pp. 11–39). Springer.

Ameliawati, M., & Setiyani, R. (2018). The influence of financial attitude, financial socialization, and financial experience to financial management behavior with financial literacy as the mediation variable. *KnE Social Sciences, 3*(10), 811–832 https://doi.org/10.18502/kss.v3i10.3174

Arifin, A. Z. (2018). Influence factors toward financial satisfaction with financial behavior as intervening variable on Jakarta area workforce. *European Research Studies Journal, 21*(1), 90–103. https://doi.org/10.35808/ersj/932

Atlas, S. A., Lu, J., Micu, P. D., & Porto, N. (2019). Financial knowledge, confidence, credit use, and financial satisfaction. *Journal of Financial Counseling and Planning, 30*(2), 175–190. https://doi.org/10.1891/1052-3073.30.2.175

Bir, S. (2014). Knowledge, attitude and their effect on the recently graduated employees' financial management practices and satisfaction. *Economic Literature, 12*(1), 69–81. http://dx.doi.org/10.3126/el.v12i0.14889

Buhmann, B., & Rainwater, L. (1988). Equivalence scales, well-being, inequality, and poverty: Sensitivity estimates across ten countries using the Luxembourg Income Study (LIS) database. *Review of Income and Wealth, 34*(2), 115–142. https://doi.org/10.1111/j.1475-4991.1988.tb00564.x

Chudry, F., Foxall, G., & Pallister, J. (2011). Exploring attitudes and predicting intentions: Profiling student debtors using an extended theory of planned behavior. *Journal of Applied Social Psychology, 41*(1), 119–149. https://doi.org/10.1111/j.1559-1816.2010.00705.x

Collis, J., & Hussey, R. (2009). *Business research: A practical guide for undergraduate and postgraduate students.* Palgrave Macmillan.

Courchane, M. & Zorn, P. (2005, June 1). *Consumer literacy and credit worthiness* [Paper presentation]. Wisconsin Department of Financial Institutions, Task Force on Financial Literacy, Wisconsin, United States. https://www.researchgate.net/profile/Marsha_Courchane/publication/5042561_Consumer_literacy_and_creditworthiness/links/547dfd7f0cf241bf4b5b9c1b.pdf

De Bassa Scheresberg, C. (2013). Financial literacy and financial behavior among young adults: Evidence and implications. *Numeracy*, *6*(2), 1–21. https://doi.org/10.5038/1936-4660.6.2.5

Dormann, C. F., Elith, J., Bacher, S., Buchmann, C., Carl, G., Carré, G., et al. (2012). Collinearity: A review of methods to deal with it and a simulation study evaluating their performance. *Ecography, 36*(1), 27–46. https://doi.org/10.1111/j.1600-0587.2012. 07348.x

Dowling, N. A., Corney, T., & Hoiles, L. (2009). Financial management practices and money attitudes as determinants of financial problems and dissatisfaction in young male Australian workers. *Journal of Financial Counseling and Planning*, *20*(2), 5–13.

Easterlin, R. A. (2006). Life cycle happiness and its sources: Intersections of psychology, economics and demography. *Journal of Economic Psychology, 27*(4), 463–482. https://doi.org/10.1016/j.joep.2006.05.002

Falahati, L., Sabri, M. F., & Paim, L. H. J. (2012). Assessment a model of financial satisfaction predictors: Examining the mediate effect of financial behavior and financial strain. *World Applied Sciences Journal, 20*(2), 190–197. https://doi.org/10.5829/idosi.wasj.2012.20.02.1832

Gallucci, M. (2019). *jAMM: jamovi Advanced Mediation Models* [Computer software]. Jamovi. https://jamovi-amm.github.io/

Gamble, K. J., Boyle, P. A., Yu, L., Bennett, D. A. (2015). Aging and financial decision making. *Management Science, 61*(11), 2603–2610. https://doi.org.10.1287/mnsc.2014.2010

Garrett, S., & James, R. N. III. (2013). Financial ratios and perceived household financial satisfaction. *Journal of Financial Therapy, 4*(1), 39–62. https://doi.10.4148/jft.v4i1.1839

Hansen, T. (2009). *Subjective well-being in the second half of life: The influence of family and household resources* [Doctoral Dissertation, University of Oslo]. British Society of Gerontology. https://www.britishgerontology.org/DB/gr-issues-2007-to-present/generations-review/subjective-well-being-in-the-second-half-of-life-t

Hansen, T., Slagsvold, B., & Moum, T. (2008). Financial satisfaction in old age: A satisfaction paradox or a result of accumulated wealth? *Social Indicators Research, 89*(2), 323–347. https://doi.org/10.1007/s11205-007-9234-z

Haws, K. L., Bearden, W. O., & Nenkov, G. Y. (2012). Consumer spending self-control effectiveness and outcome elaboration prompts. *Journal of the Academy of Marketing Science, 40*(5), 695–710. https://doi.org.10.1007/s11747-011-0249-2

Heerwegh, D. (2009). Mode differences between face-to-face and web surveys: An experimental investigation of data quality and social desirability effects. *International Journal of Public Opinion Research, 21*(1), 111–121. https://doi.org/10.1093/ijpor/edn054

Henager, R., & Cude, B. J. (2016). Financial literacy and long- and short-term financial behavior in different age groups. *Journal of Financial Counseling and Planning, 27*(1), 3–19. https://doi.org/10.1891/1052-3073.27.1.3

Henchoz C., Coste T., & Wernli B. (2019). Culture, money attitudes and economic outcomes. *Swiss Journal of Economics and Statistics, 155*(2), 1–13. https://doi.org/10.1186/s41937-019-0028-4

Hershfield, H. E., Goldstein, D. G., Sharpe, W. F., Fox, J., Yeykelis, L., Carstensen, L. L., & Bailenson, J. N. (2011). Increasing saving behavior through age-progressed renderings of the future self. *Journal of Marketing Research, 48*(SPL), S23–S37. https://doi.org/10.1509/jmkr.48.SPL.S23

Hira, T. K., & Mugenda, O. M. (1999). The relationships between self-worth and financial beliefs, behavior, and satisfaction. *Journal of Family and Consumer Sciences, 91*(4), 76–82.

Hirvonen, J. (2018). *Financial behavior and well-being of young adults: Effects of self-control and optimism* [Master thesis, University of Jyväskylä]. Jyväskylä University Library. https://jyx.jyu.fi/bitstream/handle/123456789/59898/URN NBN_fi_jyu-201810224480.pdf?sequence=3&isAllowed=y

Howlett, E., Kees, J., & Kemp, E. (2008). The role of self-regulation, future orientation, and financial knowledge in long-term financial decisions. *Journal of Consumer Affairs, 42*(2), 223–242. https:///doi.org/10.1111/j.1745-6606.2008.00106.x

Huston, S. J. (2010). Measuring financial literacy. *The Journal of Consumer Affairs, 44*(2), 296–316. https://doi.org/10.1111/j.1745-6606.2010.01170.x

IBM (International Business Machines Corporation). (2018, June 16). *Transforming different Likert scales to a common scale.* International Business Machines Corporation. https://www.ibm.com/support/pages/node/422073

Jeon, J. (2015). The strengths and limitations of the statistical modeling of complex social phenomenon: Focusing on SEM, path analysis, or multiple regression models. *International Journal of Social, Behavioral, Educational, Economic, Business and Industrial Engineering, 9*(5), 1629–1637. https://doi.org/10.5281/zenodo.1105869

Joo, S. (1998). *Personal financial wellness and worker job productivity* [Doctoral Dissertation, Virginia Polytechnic Institute and State University]. ProQuest. https://vtechworks.lib.vt.edu/handle/10919/30519

Joo, S., & Grable, J. E. (2004). An exploratory framework of the determinants of financial satisfaction. *Journal of Family and Economic Issues, 25*(1), 25–50. https://doi.org/10.1023/B:JEEI.0000016722.37994.9f

Kalwij, A. S., Alessie, R., Dinkova, M., Schonewille, G., Van der Schors, A. & Van der Werf, M. (2019). The effects of financial education on financial literacy and savings behavior: Evidence from a controlled field experiment in Dutch primary schools. *The Journal of Consumer Affairs, 53*(3), 699–730. https://doi.org/10.1111/joca.12241

Kempson, E., & Poppe, C. (2018). *Understanding financial well-being and capability - A revised model and comprehensive analysis*. Consumption Research Norway (SIFO).

Kirbiš, I. S., Vehovec, M., & Galić, Z. (2017). Relationship between financial satisfaction and financial literacy: Exploring gender differences. *Sociology, 2*(1), 165–185. https://doi.org/10.5559/di.26.2.02

Lajuni, N., Abdullah, N., Bujang, I., & Yacob, Y. (2018). Examining the predictive power of financial literacy and theory of planned behavior on intention to change financial behavior. *International Journal of Business and Management Invention, 7*(3), 60–66.

Little, R. J. A. (1988). A test of missing completely at random for multivariate data with missing values. *Journal of the American Statistical Association, 83*(404), 1198–1202. https://doi.org/10.1080/01621459.1988.10478722

Lusardi, A., & Mitchell, O. S. (2011). Financial literacy around the world: An overview. *Journal of Pension Economics and Finance, 10*(4), 497–508. https://doi.org/10.3386/w17107

Lusardi, A., & Mitchell, O. S. (2014). The economic importance of financial literacy: Theory and evidence. *Journal of Economic Literature, 52*(1), 5–44. https://doi.org/10.3386/w18952

Madern, T. E. (2015). *Op weg naar een schuldenvrij leven. Gezond financieel gedrag noodzakelijk om financiële problemen te voorkomen [Towards a debt-free life. Healthy financial behavior necessary to prevent financial problems]* [Doctoral Dissertation, Leiden University]. Leiden University Scholarly Publications. https://openaccess.leidenuniv.nl/handle/1887/35411

MAS (Money Advice Service). (2018a). *Financial capability in the UK: Results from the 2018 survey of adults* (Report). The Money Advice Service. https://masassets.blob.core.windows.net/cms/files/000/001/122/original/Financial_Capability_Building_Blocks_Technical_Report_2018.pdf

MAS (Money Advice Service). (2018b). *Financial Capability Survey 2018* (Report). The Money Advice Service. https://masassets.blob.core.windows.net/cms/files/000/001/121/original/Financial_Capability_Survey_2018_-_Survey_Technical_Report.pdf

Metcalf, B. R., & Zimbardo, P. (2016). Time perspective theory. In H. L. Miller (Ed.), *Encyclopedia of theory in psychology* (pp. 937–939). Sage.

Mudzingiri, C., Mwamba, J. W. M., & Keyser, J. N. (2018). Financial behavior, confidence, risk preferences and financial literacy of university students. *Cogent Economics & Finance, 6*(1), 1–25. https://doi.org/10.1080/23322039.2018.1512366

Mugenda, O., Hira, T., & Fanslow, A. (1990). Assessing the causal relationship among communication, money management practices, satisfaction with financial status, and satisfaction with quality of life. *Lifestyles: Family and Economic Issues, 11*(4), 343–360. https://doi.org/10.1007/BF00987345

Nyström, J., & Romberg, K. (2017). *The influence of time and risk preferences on financial behaviour and financial well-being: Results from a national survey* [Master thesis, Linköping University]. DiVA Portal. http://liu.diva-portal.org/smash/record.jsf?pid=diva2%3-A1114743&dswid=4755

Rha, J.-Y. , Montalto, C. P., & Hanna, S. D. (2006). The effect of self-control mechanisms on household saving behavior. *Journal of Financial Counseling and Planning, 17*(2), 1–16.

Robb, C. A., & Woodyard, A. S. (2016). Consideration of financial satisfaction: What consumers know, feel and do from a financial perspective. *Journal of Financial Therapy, 7*(2), 41–61. https://doi.org/10.4148/1944-9771.1102

Rosseel, Y. (2012). lavaan: An R Package for Structural Equation Modeling. *Journal of Statistical Software, 48*(2), 1–36. http://www.jstatsoft.org/v48/i02/

Rutledge, D., & Deshpande, S. (2014). The influence of time orientation on personal finance behaviours. In K. Kubacki (Ed.), *Ideas in marketing: Finding the new and polishing the old* (pp. 67–76). Springer.

Seay, M., Asebedo, S., Thompson, C., Stueve, C., & Russi, R. (2015). Mortgage holding and financial satisfaction in retirement. *Journal of Financial Counseling and Planning, 26*(2), 200–216. https://doi.org/10.1891/1052-3073.26.2.200

Simonse, O., Van der Werf, M., & Wilmink, G. (2017). *Effective ways to advance responsible financial behaviour* (Report). Wijzer in geldzaken [Money Wise platform]. https://www.wijzeringeldzaken.nl/platform-wijzeringeldzaken/publicaties/Effective_ways_to_advance_responsible_financial_behaviour.pdf. Accessed 10 October 2019.

Stage, F. K., Carter, H. C., & Nora, A. (2004). Path analysis: An introduction and analysis of a decade of research. *The Journal of Educational Research, 98*(1), 5–12. https://doi.org/10.3200/JOER.98.1.5-13

Susilowati, N., Latifah, L., & Jariyah. (2017). College students financial management behavior: An empirical study on the mediating effect of attitude toward money. *Advanced Science Letters, 23*(8), 7468–7472. https://doi.org/10.1166/asl.2017.9500

The jamovi project. (2019). *jamovi* (Version 0.9) [Computer Software]. Jamovi. https://www.jamovi.org

Thompson, E., Prendergast, G. P., & Dericks, G. H. (2019). Do the happy-go-lucky? *Current Psychology.* https://doi.org/10.1007/s12144-019-00554-w

Van Ginkel, J., Linting, M., Rippe, R., & Van der Voort, A. (2019). Rebutting existing misconceptions about multiple imputation as a method for handling missing data. *Journal of Personality Assessment, 102*(2), 1–12. https://doi.org.10.1080/00223891.2018.1530680

Van Rooij, M. C. J., Lusardi, A., & Alessie, R. J. M. (2012). Financial literacy, retirement planning and household wealth. *Economic Journal, Royal Economic Society, 122*(560), 449–478. https://doi.org/10.3386/w17339

Wiese, C. W., Tay, L., Duckworth, A. L., D'Mello, S., Kuykendall, L., Hofmann, W., ... & Vohs, K. D. (2018). Too much of a good thing? Exploring the inverted-u relationship between self-control and happiness. *Journal of Personality, 86*(3), 380–396. https://doi.org/10.1111/jopy.12322

Xiao, J. J., Chen, C., & Chen, F. (2014). Consumer financial capability and financial satisfaction. *Social Indicators Research, 118*(1), 415–432. https://doi.org/10.1007/s11205-013-0414-8

Xiao, J. J., Tang, C., Serido, J., & Shim, S. (2011). Antecedents and consequences of risky credit behavior among college students: Application and extension of the theory of planned behavior. *Journal of Public Policy & Marketing, 30*(2), 239–245. https://doi.org/10.2307/23209278

Appendices

Appendix A. *Descriptive and correlation results of all variables included in the present study*

Variable (range)	*M*	*SD*	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Financial satisfaction (1-11)	7.11	2.54	.01	.44	.45	.18	.19	-.08	.27	.02	.60	.44	.09	-.09	.19	-.18	-.01	.24	.33
2. Not borrowing for the short term (1-5)	3.95	1.13	—	.05	-.13	-.24	.43	.02	-.22	.31	.07	-.03	.00	.65	.42	.11	.33	-.21	.10
3. Active saving (1-4)	2.93	1.14		—	.44	.19	.18	-.01	.28	.09	.34	.36	.16	-.06	.16	-.12	-.14	.25	.26
4. Working toward goals (1-5)	3.47	1.06			—	.36	.11	-.00	.37	.08	.41	.48	.19	-.12	.13	-.17	-.12	.30	.26
5. Adjusting spending (1-11)	7.54	2.00				—	-.10	.04	.31	-.04	.28	.42	.27	-.18	-.10	-.01	-.20	.19	-.03
6. Managing credit use (1-5)	3.06	1.39					—	.02	.10	.30	.18	.09	.11	.33	.32	-.05	.28	-.01	.24
7. Keeping track (1-6)	4.84	1.07						—	.05	.03	.01	-.07	.06	.04	.02	.06	-.03	-.01	.04
8. Shopping around (1-4)	2.75	0.81							—	.03	.30	.26	.20	-.18	.00	-.13	-.10	.21	.12
9. Financial knowledge (0-3)	1.66	1.12								—	.15	.03	.16	.29	.23	-.11	.26	.06	.16
10. Financial confidence (1-11)	8.48	1.84									—	.45	.16	.08	.21	-.21	.08	.20	.23
11. Future orientation (1-11)	7.83	2.41										—	.20	-.01	.12	-.12	-.05	.19	.13
12. Attitude toward money (1-5)	4.17	0.77											—	.10	.02	.04	.04	.10	.06
13. Spending self-control (1-11)	7.03	2.91												—	.34	.09	.35	-.19	.06
14. Perceived behavioral control (1-5)	3.25	1.24													—	.01	.07	.01	.16
15. Gender	—	—														—	-.12	-.13	-.14
16. Age	—	—															—	-.24	.08
17. Education	—	—																—	.28
18. Effective income	—	—																	—

Note. Pearson's correlation coefficients among the continuous variables, point-biserial correlation coefficients between the dichotomous and the continuous variables, phi correlation coefficients among the dichotomous variables, Spearman's correlation coefficients between the ordinal and the continuous variables, and rank-biserial correlation coefficients between the dichotomous and the ordinal variables were calculated. All correlations equal to or larger than |0.04| are statistically significant ($p < .05$), except for the correlation between financial knowledge and adjusting spending, and the correlation between keeping track and spending self-control.

Appendix B. *Indirect effects on financial satisfaction*

Variable	Standardized effects	*z*	95% CI Lower	95% CI Upper
Indirect Effects				
Financial knowledge=>Not borrowing for the short term=>Financial satisfaction	.00	1.95	-0.00	0.02
Financial knowledge=>Active saving=>Financial satisfaction	.01	1.88	-0.00	0.03
Financial knowledge=>Working toward goals=>Financial satisfaction	.00	1.62	-0.00	0.02
Financial knowledge=>Adjusting spending=>Financial satisfaction	-.00	0.52	-0.01	0.00
Financial knowledge=>Managing credit use=>Financial satisfaction	.01**	3.21	0.01	0.03
Financial knowledge=>Keeping track=>Financial satisfaction	-.00	0.96	-0.01	0.00
Financial knowledge=>Shopping around=>Financial satisfaction	.00	0.49	-0.00	0.00
Financial confidence=>Not borrowing for the short term=>Financial satisfaction	-.00	0.14	-0.00	0.00
Financial confidence=>Active saving=>Financial satisfaction	.02***	4.71	0.02	0.05
Financial confidence=>Working toward goals=>Financial satisfaction	.02***	3.65	0.01	0.04
Financial confidence=>Adjusting spending=>Financial satisfaction	-.01**	3.07	-0.03	-0.01
Financial confidence=>Managing credit use=>Financial satisfaction	.00	1.52	-0.00	0.01
Financial confidence=>Keeping track=>Financial satisfaction	-.00	1.80	-0.01	-0.00
Financial confidence=>Shopping around=>Financial satisfaction	.00	0.99	-0.00	0.02
Future orientation=>Not borrowing for the short term=>Financial satisfaction	-.00	0.35	-0.00	0.00
Future orientation=>Active saving=>Financial satisfaction	.03***	6.15	0.02	0.05
Future orientation=>Working toward goals=>Financial satisfaction	.03***	4.01	0.02	0.05
Future orientation=>Adjusting spending=>Financial satisfaction	-.02**	3.27	-0.04	-0.01
Future orientation=>Managing credit use=>Financial satisfaction	.00	1.48	-0.00	0.01
Future orientation=>Keeping track=>Financial satisfaction	.01**	3.20	0.00	0.01
Future orientation=>Shopping around=>Financial satisfaction	.00	0.94	-0.00	0.01
Attitude toward money=>Not borrowing for the short term=>Financial satisfaction	-.00	1.84	-0.02	0.00
Attitude toward money=>Active saving=>Financial satisfaction	.01***	3.53	0.02	0.07
Attitude toward money=>Working toward goals=>Financial satisfaction	.01**	3.14	0.01	0.05
Attitude toward money=>Adjusting spending=>Financial satisfaction	-.01**	3.13	-0.07	-0.02
Attitude toward money=>Managing credit use=>Financial satisfaction	.00	1.73	0.00	0.02
Attitude toward money=>Keeping track=>Financial satisfaction	-.00*	2.46	-0.03	-0.00
Attitude toward money=>Shopping around=>Financial satisfaction	.00	1.00	-0.01	0.03
Spending self-control=>Not borrowing for the short term=>Financial satisfaction	.02*	2.07	-0.00	0.04
Spending self-control=>Active saving=>Financial satisfaction	-.01**	2.99	-0.02	-0.00
Spending self-control=>Working toward goals=>Financial satisfaction	-.01**	3.25	-0.02	-0.00
Spending self-control=>Adjusting spending=>Financial satisfaction	.01**	2.71	0.00	0.01
Spending self-control=>Managing credit use=>Financial satisfaction	.01**	3.24	0.00	0.02
Spending self-control=>Keeping track=>Financial satisfaction	-.00	1.18	-0.01	0.00
Spending self-control=>Shopping around=>Financial satisfaction	-.00	0.99	-0.01	0.00
Perceived behavioral control=>Not borrowing for the short term=>Financial satisfaction	.01*	2.06	-0.00	0.04
Perceived behavioral control=>Active saving=>Financial satisfaction	.02***	3.80	0.02	0.05
Perceived behavioral control=>Working toward goals=>Financial satisfaction	.01*	2.48	0.00	0.02
Perceived behavioral control=>Adjusting spending=>Financial satisfaction	.01**	2.77	0.01	0.03
Perceived behavioral control=>Managing credit use=>Financial satisfaction	.01***	3.49	0.01	0.04
Perceived behavioral control=>Keeping track=>Financial satisfaction	-.00	0.13	-0.01	0.01
Perceived behavioral control=>Shopping around=>Financial satisfaction	-.00	0.13	-0.00	0.00

Note. The indirect effects were estimated covariating the control variables. Confidence Intervals (CI) are computed with the Bootstrap percentiles method. * $p < .05$; ** $p < .01$; *** $p < .001$.

Appendix C. *Direct effects on financial satisfaction*

Variable	Standardized effects	*z*	95% CI Lower	95% CI Upper
Direct Effects				
Financial knowledge=>Financial satisfaction	-.08***	4.71	-0.26	-0.11
Financial confidence=>Financial satisfaction	.42***	19.12	0.52	0.65
Future orientation=>Financial satisfaction	.13***	5.78	0.09	0.18
Attitude toward money=>Financial satisfaction	-.02	1.35	-0.18	0.04
Spending self-control=>Financial satisfaction	-.16***	6.81	-0.17	-0.09
Perceived behavioral control=>Financial satisfaction	.06**	3.07	0.04	0.19

Note. Confidence Intervals (CI) are computed with the Bootstrap percentiles method. ** $p < .01$; *** $p < .001$.

Appendix D. *Total effects on financial satisfaction*

Variable	Standardized effects	*z*	95% CI Lower	95% CI Upper
Total Effects				
Financial knowledge=>Financial satisfaction	-.06***	3.48	-0.21	-0.06
Financial confidence=>Financial satisfaction	.46***	24.19	0.58	0.68
Future orientation=>Financial satisfaction	.18***	10.12	0.16	0.23
Attitude toward money=>Financial satisfaction	-.02	0.99	-0.16	0.05
Spending self-control=>Financial satisfaction	-.14***	7.59	-0.16	-0.09
Perceived behavioral control=>Financial satisfaction	.11***	6.22	0.15	0.29
Gender=>Financial satisfaction	-.02	0.97	-0.13	0.04
Age=>Financial satisfaction	.02	0.86	-0.00	0.01
Low education=>Financial satisfaction	-.08***	3.75	-0.34	-0.11
Intermediate education=>Financial satisfaction	.09***	4.30	0.17	0.44
Effective income=>Financial satisfaction	.18***	10.69	0.00	0.00

Note. High education was the reference group. Confidence Intervals (CI) are computed with the Bootstrap percentiles method. *** $p < .001$.

Appendix E. *Components effects on financial satisfaction*

Variable	Standardized effects	*z*	95% CI Lower	Upper
Financial knowledge=>Not borrowing for the short term	.10***	5.67	0.07	0.14
Not borrowing for the short term=>Financial satisfaction	.05*	2.07	-0.00	0.22
Financial knowledge=>Active saving	.04	1.90	-0.00	0.09
Active saving=>Financial satisfaction	.16***	7.93	0.26	0.43
Financial knowledge=>Working toward goals	.04	1.83	-0.00	0.07
Working toward goals=>Financial satisfaction	.09***	4.19	0.13	0.34
Financial knowledge=>Adjusting spending	.01	0.55	-0.05	0.09
Adjusting spending=>Financial satisfaction	-.07***	3.40	-0.13	-0.03
Financial knowledge=>Managing credit use	.13***	6.08	0.11	0.21
Managing credit use=>Financial satisfaction	.07***	3.77	0.06	0.19
Financial knowledge=>Keeping track	.02	1.01	-0.02	0.07
Keeping track=>Financial satisfaction	-.07***	4.66	-0.24	-0.10
Financial knowledge=>Shopping around	.02	0.82	-0.02	0.04
Shopping around=>Financial satisfaction	.02	1.01	-0.05	0.18
Financial confidence=>Not borrowing for the short term	-.00	0.16	-0.02	0.02
Financial confidence=>Active saving	.16***	6.29	0.07	0.13
Financial confidence=>Working toward goals	.19***	7.64	0.08	0.14
Financial confidence=>Adjusting spending	.17***	7.24	0.14	0.24
Financial confidence=>Managing credit use	.04	1.77	-0.00	0.06
Financial confidence=>Keeping track	.06*	1.99	0.00	0.06
Financial confidence=>Shopping around	.21***	8.54	0.07	0.11
Future orientation=>Not borrowing for the short term	-.01	0.41	-0.02	0.01
Future orientation=>Active saving	.22***	9.17	0.08	0.12
Future orientation=>Working toward goals	.32***	14.44	0.12	0.16
Future orientation=>Adjusting spending	.32***	12.06	0.22	0.31
Future orientation=>Managing credit use	.04	1.61	-0.00	0.05
Future orientation=>Keeping track	-.11***	4.91	-0.07	-0.03
Future orientation=>Shopping around	.10***	4.24	0.02	0.05
Attitude toward money=>Not borrowing for the short term	-.06***	3.91	-0.14	-0.04
Attitude toward money=>Active saving	.08***	3.97	0.06	0.18
Attitude toward money=>Working toward goals	.08***	4.79	0.07	0.17
Attitude toward money=>Adjusting spending	.20***	9.14	0.41	0.62
Attitude toward money=>Managing credit use	.04	1.95	0.00	0.14
Attitude toward money=>Keeping track	.06**	2.84	0.03	0.15
Attitude toward money=>Shopping around	.16***	7.04	0.12	0.21
Spending self-control=>Not borrowing for the short term	.49***	25.36	0.18	0.20
Spending self-control=>Active saving	-.07**	3.24	-0.04	-0.01
Spending self-control=>Working toward goals	-.13***	5.84	-0.06	-0.03
Spending self-control=>Adjusting spending	-.12***	5.16	-0.11	-0.05
Spending self-control=>Managing credit use	.16***	7.15	0.05	0.10
Spending self-control=>Keeping track	.03	1.24	-0.01	0.03
Spending self-control=>Shopping around	-.18***	7.96	-0.06	-0.04
Perceived behavioral control=>Not borrowing for the short term	.22***	12.07	0.17	0.23
Perceived behavioral control=>Active saving	.10***	4.55	0.05	0.13
Perceived behavioral control=>Working toward goals	.07**	3.24	0.02	0.09
Perceived behavioral control=>Adjusting spending	-.11***	5.28	-0.25	-0.11
Perceived behavioral control=>Managing credit use	.18***	8.37	0.15	0.25
Perceived behavioral control=>Keeping track	.00	0.13	-0.04	0.05
Perceived behavioral control=>Shopping around	-.00	0.18	-0.03	0.02

Note. Confidence Intervals (CI) are computed with the Bootstrap percentiles method. * $p < .05$; ** $p < .01$; *** $p < .001$.

Chapter 5

How executive functioning and financial self-efficacy predict subjective financial well-being via positive financial behaviors

This research was submitted for publication.

Financial well-being is an important research topic, as its benefits are far-reaching, and extend beyond the financial domain. At the individual and family level, financial well-being is positively related to quality of life, physical and mental health, relationship quality, and happiness—all ingredients of general well-being (Brüggen et al., 2017; Netemeyer, Warmath, Fernandes, & Lynch, 2018). At the organizational level, financial well-being of employees benefits organizations through engagement, loyalty, and productivity, and thereby profitability (Krekel, Ward, & De Neve, 2019; Netemeyer et al., 2018). And, at the societal level, financial well-being is associated with more welfare because it leads to more spending capacity and less reliance on social security (Brüggen et al., 2017). Against this background, financial practitioners and service providers, among others, work to lead individuals and families to a better state of financial well-being. Hence, a solid understanding of what factors determine financial well-being is crucial.

Individuals who display positive financial behaviors, such as active saving and working toward financial goals, likely have more control over their money to meet both their current and future financial obligations. Consequently, they have less stress about their current financial state and higher expectations regarding their future financial state, thus experiencing greater financial well-being. Several studies support this reasoning, showing that positive financial behaviors are a powerful predictor of financial well-being (Brüggen et al., 2017; Gutter & Copur, 2011; Riitsalu & Murakas, 2019; Riitsalu & Van Raaij, 2020). However, not all individuals express positive financial behaviors to the same degree and in the same way, so it is important to identify the individual factors that can influence these behaviors and, through these behaviors, also financial well-being.

Individuals need executive functions (those cognitive skills that enable higher-order thinking) to set financial goals and work toward them, resist impulses and stick to a budget, and decide when to save and when to buy (CFPB, 2015)—all positive financial behaviors

that contribute to financial well-being. Prior studies have not empirically addressed the suggested indirect relation of executive functions with financial well-being via positive financial behaviors. Related work has yielded mixed results. Drever et al. (2015) showed that a positive relation exists between executive functioning and positive financial behaviors, and between executive functioning and financial well-being. In contrast, Strömbäck, Skagerlund, Västfjäll, and Tinghög (2020) showed no significant relation between these three variables. The present study aims to shed some more light on the relation between executive functions, on the one hand, and positive financial behaviors and financial well-being, on the other.

Financial self-efficacious individuals (those with strong beliefs in their capacity to successfully complete a task or achieve a goal) are better able to effectively manage their personal and family finances, leading to a positive financial state in both the short and the long term. Also here, there is no empirical evidence on the suggested indirect relation of financial self-efficacy with financial well-being via positive financial behaviors. In support of such an indirect relation, related work has found a positive relation between financial self-efficacy and positive financial behaviors (Farrell, Fry, & Risse, 2016; Forbes & Kara, 2010), and between financial self-efficacy and financial well-being (Serido & Shim, 2017; Vosloo, Fouché, & Barnard, 2014). The present study broadens available work by establishing that the relation between financial self-efficacy and financial well-being occurs via positive financial behaviors.

Executive functions help individuals access their higher-order thinking, while financial self-efficacy helps them to engage in successful implementation. Apart from these separate benefits, we argue that, combined, these factors enable individuals to think and act effectively, leading them to identify more savvy financial behaviors and act upon them to advance their financial well-being. That is, the relationship between financial self-efficacy and positive financial behaviors may depend on the level of executive functioning. For

example, the higher individuals' level of executive functions, such as self-control, planning, and organizing, the better they can use their beliefs in their abilities to successfully meet financial goals, thereby helping them to identify appropriate positive financial behaviors. Similarly, the impact of executive functioning on positive financial behaviors may depend on the level of financial self-efficacy. The stronger individuals' beliefs in their capacities, the more their executive function skills can guide them to engage in positive financial behaviors. In both cases, positive behaviors may increase financial well-being. To our knowledge, no studies have investigated the moderating influence of executive functions and/or financial self-efficacy on financial well-being via positive financial behaviors. Yet, some studies have examined the moderating role of executive functions or financial self-efficacy for the two constructs separately, that is, for positive financial behaviors and financial well-being. For example, Drever et al. (2015) indicated that executive functions moderate the relation of environmental factors (e.g., poverty, stress) with both positive financial behaviors and financial well-being. Financial self-efficacy has been found to moderate the association between money attitudes and financial literacy, on the one hand, and positive financial behaviors, on the other (Bari, Yunanto, & Shaferi, 2020; Qamar, Khemta, & Jamil, 2016), as well as between credit card literacy and satisfaction with remuneration, on the one hand, and financial well-being, on the other (Limbu & Sato, 2019; Vosloo et al., 2014). The just-described moderating effects of executive functions and financial self-efficacy on either positive financial behaviors or financial well-being, together with the finding that positive financial behaviors and financial well-being are associated, testify to the possible moderating roles of executive functioning and financial self-efficacy in predicting financial well-being via positive financial behaviors.

The contribution of our study is threefold. First, we examined whether executive functioning and financial self-efficacy predict financial well-being via positive financial

behaviors, which has been proposed as a promising path, but has not been empirically tested directly before (CFPB, 2015). Second, we tested the moderating roles of executive functioning and financial self-efficacy in predicting financial well-being via positive financial behaviors, which, to our knowledge, has not been previously studied. If executive functioning and financial self-efficacy indeed influence each other, financial practitioners have another avenue to better individuals' financial behaviors and financial well-being, by using strategies that combine the two factors in their interventions and practices. Third, we assessed financial self-efficacy, which is a different concept from financial confidence. Whereas the impact of financial confidence on financial well-being through financial behaviors has been studied, such an examination is lacking for financial self-efficacy (Kempson, Finney, & Poppe, 2017). Confidence refers to having a strong belief, but this belief may concern something positive or negative (e.g., strong belief that one is able or unable to accomplish something), whereas self-efficacy entails having a strong, positive belief that one has the ability to achieve a task or goal (Bandura, 1977, 1997). Thus, we think that focusing on self-efficacy may help us better understand the association between positive financial behaviors and financial well-being. Finally, our study fits with the recommendation for further research on individual factors that predict financial well-being (Wilmarth, 2020). Findings from this study could provide financial practitioners and service providers, among others, with novel insights to help individuals and families improve their financial behaviors and their financial well-being by increasing executive functioning and financial self-efficacy.

Literature review

Financial well-being

The current literature lacks generally accepted definitions and measurements of financial well-being. Research on financial well-being can be classified into three categories: (a) both objective and subjective elements, (b) objective elements only, and (c) subjective elements only (Brüggen et al., 2017). Objective elements concern individuals' actual financial condition, such as income, assets, and debt. Subjective elements involve how individuals assess their own financial condition, such as their satisfaction with their standard of living or financial status. Individuals with an identical objective financial well-being can have very different levels of subjective financial well-being. As an illustrative example, two individuals have a similar income of £2,000 per month. However, one individual overspends and ends up frustrated due to excessive debt, while the other individual spends responsibly and saves, thereby enjoying life. Consequently, although both individuals enjoy the same objective financial well-being, the latter will likely report greater subjective financial well-being than the former. Hence, in the current study, we opted for a subjective measure, because it implies a broader, intangible interpretation of the concept of financial well-being, whereas an objective approach provides a more limited, tangible interpretation (see e.g., Peterson & Bush, 2013).

With respect to subjective financial well-being specifically, there seems to be agreement on two dimensions in the literature, namely current financial stress and expected future financial security (CFPB, 2015; Netemeyer et al., 2018). Current financial stress encompasses having insufficient financial resources and lacking control over one's present financial situation. Expected future financial security refers to being able to meet one's distant financial goals. The Consumer Financial Protection Bureau (CFPB, 2015) was among the first to develop a single measure for both dimensions. This measure, however, focused

more on the current dimension than the future one. Hence, recent research recommends using two measures, to enable an equal assessment of the two dimensions (Netemeyer et al., 2018).

Determinants of financial well-being

The CFPB (2015) carried out extensive qualitative research to develop a conceptual framework of the determinants of financial well-being. In this framework, positive financial behaviors (those behaviors that lead to effective financial decisions) were identified as the most powerful determinant of financial well-being and these behaviors, in turn, were found to be affected by individual factors. Among these factors, executive functions and financial self-efficacy were marked as important, which is particularly relevant for the current study. According to the CFPB, executive functions help individuals to plan ahead, control impulses, and think creatively to handle unanticipated challenges, and financial self-efficacy help individuals to believe in their ability to influence financial outcomes. The CFPB framework provides a good theoretical foundation, but is limited because the identified relationships were not empirically tested.

Subsequent studies used similar elements as this framework and showed that several individual factors, such as knowledge, skills, attitudes, and psychological traits, were related to financial well-being via positive financial behaviors (Iramani & Lutfi, 2021; Kempson et al., 2017; Selvia, Rahmayanti, Afandy, & Zoraya, 2020). However, to our knowledge, none of these studies empirically examined the role of executive functions and financial self-efficacy in predicting positive financial behaviors and, in turn, financial well-being. Thus, the current study fills this gap and provides possible strategies for financial practitioners and service providers, among others, to help individuals and families better their financial behaviors and financial well-being. In the following, we discuss the path of executive functions and financial self-efficacy to financial well-being via positive financial behaviors.

Executive functioning, positive financial behaviors, and financial well-being

Executive functioning consists of a set of mental processes or cognitive abilities or skills necessary for goal-directed behavior (Diamond, 2013; Van der Elst et al., 2012). In the literature, there is agreement on at least three core executive functions: (a) attention, (b) self-control and self-monitoring, and (c) planning and initiative. Attention involves holding (verbal and nonverbal) information in mind and working on it, thereby seeing connections between what happened earlier and what comes later. Self-control and self-monitoring regard controlling one's behavior to resist dysfunctional habits and temptations. Planning and initiative build on the previous two executive functions because these enable one to change perspectives by deactivating previous perspectives (self-control and self-monitoring) and activating new perspectives (attention). Together, these three core executive functions allow for higher-order thinking, such as reasoning and problem solving (Collins & Koechlin, 2012). These executive function skills can help individuals engage in positive financial behaviors. To illustrate, establishing financial goals and remaining focused on them might prevent the use of overdrafts and promote paying bills on time. Similarly, overriding urges and impulses that push away from financial goals enables responsible spending and tracking expenses. Likewise, being able to plan and organize how to achieve financial goals can instigate active saving and investing. All these positive financial behaviors, in turn, may increase financial well-being.

Studies have shown that executive functioning is an important contributor to several well-being outcomes, such as mental health (Fairchild et al., 2009), physical health (Miller, Barnes, & Beaver, 2011), and quality of life (Brown & Landgraf, 2010). In the current study, we argue that this relation is also present in the financial domain. Specifically, as illustrated earlier, we posit that executive functioning supports positive financial behaviors which, in turn, contribute to financial well-being. To date, no studies have empirically tested this

indirect relationship. There is evidence on both the relationship between executive functioning and positive financial behaviors, and between executive functioning and financial well-being (Drever et al., 2015; Strömbäck et al., 2020), but this evidence is limited and mixed. Whereas some studies showed positive relations between aforementioned three variables (Drever et al., 2015), other studies found no significant relations (Strömbäck et al., 2020). Thus, the empirical question remains of whether executive functioning can contribute to financial well-being via its association with positive financial behaviors.

Financial self-efficacy, positive financial behaviors, and financial well-being

Self-efficacy, a concept originally proposed by Bandura (1977, 1997), refers to individuals' beliefs in their own capacity to successfully complete a task or meet a goal. Self-efficacious individuals generally consider complex tasks as challenges to overcome, establish a deep interest in their tasks, set challenging goals and remain committed to meeting them, and recover rapidly from problems and disappointments. The concept of financial self-efficacy is related to Bandura's self-efficacy theory, involving the perceived ability to complete financial tasks and meet financial goals (Lapp, 2010). The higher individuals' financial self-efficacy, the more motivated they are to master financial challenges. This, subsequently, can promote positive financial behaviors, like working toward financial goals, and, in turn, increase financial well-being.

It is well documented that self-efficacy predicts successful well-being outcomes, such as mental health (Tahmassian & Moghadam, 2011), physical health (Rimal & Moon, 2009), and quality of life (Banik et al., 2018). In the current study, we argue that this relation is also present in the financial sphere. Specifically, as described earlier, we posit that financial self-efficacy supports positive financial behaviors which, in turn, contribute to financial well-being. So far, there are no studies that have empirically addressed this indirect relation.

Related previous work has shown that financial self-efficacy is positively associated with positive financial behaviors, such as investing and (retirement) saving (CFPB, 2018; Farrell, Fry, & Risse, 2016; Forbes & Kara, 2010). Some studies also showed that financial self-efficacy is positively related to financial well-being (Sabri, Wijekoon, & Rahim, 2020; Vosloo, Fouché, & Barnard, 2014). Again here, however, the empirical question remains of whether financial self-efficacy can contribute to financial well-being through its connection to positive financial behaviors.

Conceptual framework of the present study

The preceding literature review provides a solid foundation to develop the conceptual framework of the present study. We postulated that executive functions and financial self-efficacy, separately and in combination, predict positive financial behaviors, which, in turn, predict financial well-being. Figure 1 presents our conceptual framework.

We hypothesized that executive functions are positively related to financial well-being via positive financial behaviors (H1 in Figure 1). We also hypothesized that financial self-efficacy is positively related to financial well-being via positive financial behaviors (H2 in Figure 1). Furthermore, we hypothesized that the relationship as described in Hypothesis 1 is stronger with increasing levels of financial self-efficacy (H3a in Figure 1). And we hypothesized that the relationship as described in Hypothesis 2 is stronger with increasing levels of executive functioning (H3b in Figure 1). We treated all demographic factors as control variables.

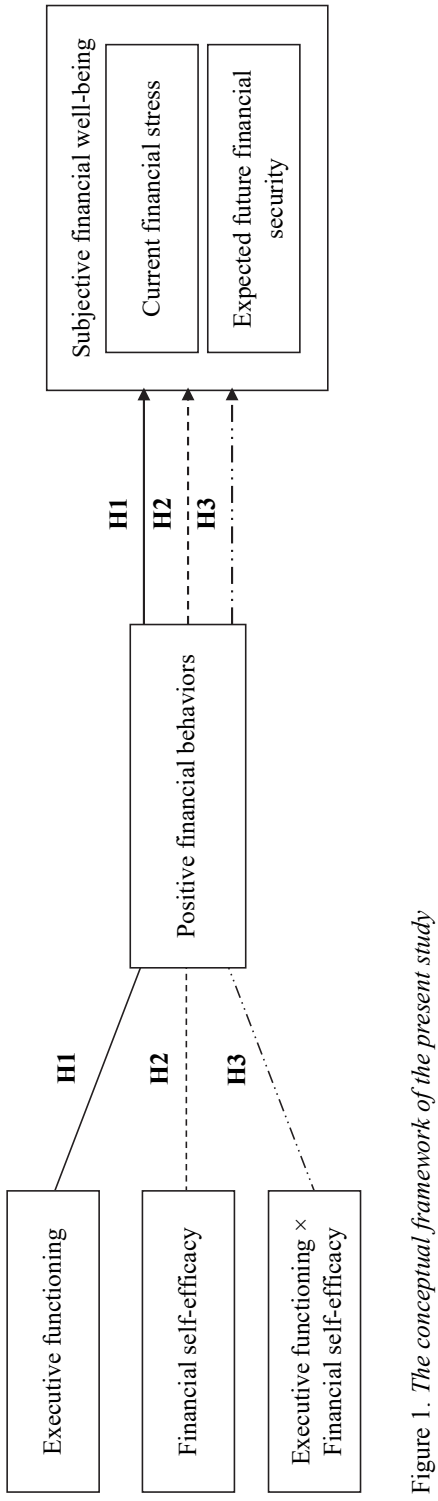

Figure 1. *The conceptual framework of the present study*

Method

Participants and study design

Using the software program G*Power, we approximated the power of the coefficient tests with an Ordinary Least Squares (OLS) power analysis to calculate the required sample size for the present study. The power analysis suggested a sample of 406 respondents. However, because our pilot study (including 20 respondents randomly sampled) revealed that 20% of the respondents were not responsible (personally or jointly) for their households' day-to-day financial decisions, one of our requirements for participation in the present study, we decided to recruit a larger sample of 488 respondents.

The aim was to obtain .90 power to detect a small effect size of Cohen's d .05 given the standard .05 alpha error probability. Respondents were selected to obtain a representative sample of the UK population and they completed the survey during 10-12 December 2020. We collected the data through the online platform Prolific (www.prolific.com). According to the guidelines of this platform, we paid each respondent £1.25 for 10 minutes to complete the survey. The representative sample was stratified across age, gender, and ethnicity. To improve the quality of our data, we considered the following aspects: (a) requesting respondents to manually indicate their unique Prolific ID and the unique survey completion code, (b) including a captcha, (c) preventing ballot box stuffing, and (d) manually approving the data to check whether the time spent on completing the survey was not unreasonably fast.

From the collected sample of 488 respondents, only data from respondents who lived in the UK, who were a native English speaker, and who were responsible (personally or jointly) for their households' day-to-day financial decisions were included in the present study. This resulted in a sample of 411 respondents between the ages of 18 and 88 years (M_{age}

= 48 years, *SD* = 14.62; 48.4% male and 51.6% female).[37] Among the sample, 25.3% had less than upper secondary education, 16.3% had upper secondary education, 8.8% had higher professional education, 33.8% had undergraduate university education, and 15.8% had postgraduate university education. More than one-third of the sample (37.5%) was employed full-time, 15.3% were employed part-time, 8.5% were self-employed, 6.1% were unemployed, 19.5% were (semi-)retired, and 13.1% were not employed for other reasons (e.g., students, disabled, and caretakers). The mean effective monthly household income was £2,023 (*SD* = 1,399), and the mean subjective socioeconomic status score was 5.51 (*SD* = 1.55). The Psychology Research Ethics Committee of Leiden University approved the study (V1–2513, December 2020). All hypotheses, measures, and analyses for this study were preregistered at Open Science Framework (OSF, https://osf.io/pfz8k/).

Measures

Subjective financial well-being. We measured two components of subjective financial well-being: (a) current financial stress and (b) expected future financial security.

For current financial stress, we used the 5-item version of the Psychological Inventory of Financial Scarcity (PIFS) Scale (Van Dijk, Van der Werf, & Van Dillen, 2021; see Table 1, for the five items), which has a strong internal consistency (Cronbach's α = .92-.95) and a strong construct validity based on five large-scale survey-based samples (*N* = 1,122-4,901). The PIFS assesses the subjective experience of financial scarcity and covers stress appraisals (i.e., insufficient financial resources and lack of control over one's financial situation) and stress responses (i.e., financial rumination and worry, and a short-term focus). Answers were provided on a 7-point Likert scale ranging from 1 (*does not describe me at all*) to 7 (*describes me completely*). An exploratory factor analysis using maximum likelihood

[37]Because only three respondents identified themselves as other genders (1% of the sample), we treated these answers as missing.

extraction and promax rotation with Kaiser normalization yielded one factor, explaining 70% of the variance (Eigenvalue = 3.5) with factor loadings from .698 to .895. Thus, we computed factor scores for current financial stress using all 5 items based on regression coefficients (Cronbach's α = .89).

For expectations regarding one's future financial security, we used the 5-item expected future financial security subscale of the Perceived Financial Well-Being Scale (Netemeyer et al., 2018; see Table 1, for the five items), which has a strong internal consistency (Cronbach's α = .90-.93) and a strong construct validity based on three large-scale survey-based samples (*N* = 3,000-6,000). Answers were provided on a 7-point Likert scale ranging from 1 (*does not describe me at all*) to 7 (*describes me completely*). An exploratory factor analysis using maximum likelihood extraction and promax rotation with Kaiser normalization yielded one factor, explaining 77% of the variance (Eigenvalue = 3.9) with factor loadings from .729 to .952. Thus, we computed factor scores for expected future financial security using all 5 items based on regression coefficients (Cronbach's α = .93).[38] [39]

[38]We used the expected future financial security subscale of the Perceived Financial Well-Being Scale, because all items consistently represented aspects regarding one's financial future. We did not use the current financial stress subscale of the aforementioned scale, because it captures items related to lack of money and lack of control over one's financial situation only (i.e., stress appraisals). Instead, we used the PIFS, because the latter covers both stress appraisals and stress responses (e.g., financial rumination and worry).

[39]To assess that item 1 of expected future financial security (the revised item) did not impact our estimates, we conducted a robustness check by performing a path analysis that included expected future financial security without the aforementioned item. Results were practically equivalent in both cases, thereby indicating that the financially secure item did not affect our estimates. As the results did not differ, we decided to use the expected future financial security scale including all items, as described in the main text. The path analysis with the expected future financial security variable excluding the aforementioned item is available online at: https://osf.io/4aqkr/.

Table 1. *Items for subjective financial well-being*

Statement
Current financial stress
1. I often don't have enough money.
2. I experience little control over my financial situation.
3. I am constantly wondering whether I have enough money.
4. I worry about money a lot.
5. I am only focusing on what I have to pay at this moment rather than my future expenses.
Expected future financial security
1. I am financially secure. (original statement: I am *becoming* financially secure)
2. I am securing my financial future.
3. I will achieve the financial goals that I have set for myself.
4. I have saved (or will be able to save) enough money to last me to the end of my life.
5. I will be financially secure until the end of my life.

Note. The adapted text is printed in italics.

Positive financial behaviors. We used seventeen positive financial behaviors, covering several topics, namely paying bills on time, paying credit card bills in full, paying mortgage or rent, having emergency funds, and having investments, as proposed by Wagner and Walstad (2018); tracking expenses, staying within budget plan, shopping around, paying loans above minimum, and saving without goals from the Financial Management Behavior Scale (FMBS) developed by Dew and Xiao (2011); and reviewing credit report, saving for long-term goals, working toward financial goals, figuring out retirement saving, saving for retirement, responsible spending, and using overdrafts responsibly as presented by Kim, Anderson, and Seay (2019) (see Table 2, for all assessed items). Answers were provided on a 7-point Likert scale ranging from 1 (never) to 7 (always). Initial exploratory factor analysis using maximum likelihood extraction and promax rotation with Kaiser normalization yielded five factors (Eigenvalue of the first factor = 5.2, Eigenvalue of the other four factors = 1.5, 1.2, 1.1, and 1.0, respectively). Because we observed a large drop-off between the first factor (Eigenvalue = 5.2) and the second factor (Eigenvalue = 1.5), a distinction between different factors is not needed and, therefore, we proceeded with one factor. This factor explained 33% of the variance with the highest factor loading being .827, 13 items with factor loadings greater than .300, and only 2 items with factor loadings below .250. Only item 8 (shopping

around) had a very low factor loading of .023, so we decided to exclude it. Thus, we performed an additional exploratory factor analysis using maximum likelihood extraction in which we restricted the number of factors to one, and computed factor scores for positive financial behaviors using the remaining 16 items based on regression coefficients (Cronbach's $\alpha = .85$).[40]

Table 2. *Items for positive financial behaviors*

Topic	Statement
Paying bills on time	1. I paid my bills on time.
Paying loans above minimum	2. I made only minimum payments on my loans. Please do not include your mortgage or rent payments.*
Paying mortgage or rent	3. I made my mortgage or rent payments.
Paying credit card bills in full	4. I paid my credit card bills in full.
Keeping track of expenses	5. I kept a written or electronic record of my expenses.
Reponsible spending	6. I spent more than my income. Please do not include the purchase of a new house or car, or other big investments you may have made.*
Staying within budget plan	7. I stayed within my (household) budget or spending plan.
Shopping around	8. I compared products or services before purchasing them.**
Using overdrafts responsibly	9. I overdrew my checking account.*
Reviewing credit report	10. I reviewed my credit report to monitor my financial reputation (good credit).
Having emergency funds	11. I set aside emergency or rainy day funds that would cover my expenses for 3 months, in case of sickness, job loss, economic downturn, or other emergencies.
Saving without goals	12. I saved money from every paycheck.
Saving for long-term goals	13. I saved money for long-term goals such as education, a car, or a home.
Working toward financial goals	14. I set long-term financial goals and strived to achieve them.
Figuring out retirement saving	15. I tried to figure out how much I need to save for retirement.
Saving for retirement	16. I put money into one or more retirement plans (either through an employer or not).
Having investments	17. Not including retirement accounts, I invested money in stocks, bonds, mutual funds, or other securities.

Note. * reverse scored, ** excluded from the positive financial behaviors variable.

[40]To assess whether the inclusion of the items 15 and 16 impacted our results, we ran a robustness check in which we conducted a path analysis with and without these items in the positive financial behaviors variable. Results were practically equivalent in both cases, thereby indicating that the two retirement items did not affect our estimates. As the results did not differ, we decided to use the positive financial behaviors variable, as described in the main text. The path analysis with the positive financial behaviors variable excluding the aforementioned items is available online at: https://osf.io/4aqkr/.

Executive functioning. We used the 13-item Amsterdam Executive Function Inventory (AEFI; Van der Elst et al., 2012; see Table 3, for the thirteen items). The AEFI measures the three core executive functions: (a) attention (three items), (b) self-control and self-monitoring (five items), and (c) planning and initiative (five items). Answers were provided on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Initial exploratory factor analysis using maximum likelihood extraction and promax rotation with Kaiser normalization yielded two factors (the first factor with a large Eigenvalue of 5.1, the second factor with a small Eigenvalue of 2.0). The factor loadings method, however, revealed that only items 12 and 13 explained the second factor. For this reason, we removed these two items and continued with one factor. This factor explained 45% of the variance with factor loadings from .372 to 914. Thus, we performed an additional exploratory factor analysis using maximum likelihood extraction in which we restricted the number of factors to one, and computed factor scores for executive functioning using the remaining 11 items based on regression coefficients (Cronbach's $\alpha = .88$).

Table 3. *Items for executive functioning*

Attention
1. I am not able to focus on the same topic for a long period of time.*
2. I am easily distracted.*
3. My thoughts easily wander.*
Self-control and self-monitoring
4. I often react too fast. I've done or said something before it is my turn.*
5. It is difficult for me to sit still.*
6. It takes a lot of effort for me to remember things.*
7. I often forget what I have done yesterday.*
8. I often lose things.*
Planning and initiative
9. I can make fast decisions.
10. I am well-organized. For example, I am good at planning what I need to do during a day.
11. It is easy for me to come up with a different solution if I get stuck when solving a problem.
12. I am full of new ideas.**
13. I am curious, I want to know how things work.**

Note. * reverse scored. ** excluded from the executive functioning variable.

Financial self-efficacy. We used the 5-item Financial Self-Efficacy Scale (Montford & Goldsmith, 2016; see Table 4, for the five items). Answers were provided on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). An exploratory factor analysis using maximum likelihood extraction and promax rotation with Kaiser normalization yielded one factor, explaining 73% of the variance (Eigenvalue = 3.7) with factor loadings from .700 to .949. Thus, we computed factor scores for financial self-efficacy using all 5 items based on regression coefficients (Cronbach's α = .90).

Table 4. *Items for financial self-efficacy*

Statement
1. I am fully capable of making personal *financial* decisions.
2. I am confident in my ability to make personal *financial* decisions.
3. I do not feel I am qualified for the task of making personal *financial* decisions.*
4. Using *financial* information available is well within the scope of my abilities.
5. My past experiences increase my confidence that I will be able to successfully make personal *financial* decisions.

Note. The term 'financial' was 'investment' in the original scale. * reverse scored.

Demographic control variables. We used gender (female and male), age (continuous: ranging from 18 to 88 years old), education (five categories: less than upper secondary education, upper secondary education, higher professional education, undergraduate university education, and postgraduate university education), occupation (six categories: employed part-time, [semi-] retired, self-employed, unemployed, not employed for other reasons, and employed full-time), effective income[41] (continuous: ranging from £66 to £9,374), and subjective socioeconomic status (continuous: ranging from 1 to 9) as the demographic control variables (see Table 5). Previous research has shown that said variables were related to positive financial behaviors and/or financial well-being (see e.g., Kempson & Poppe, 2018). We used the last category of education and occupation as the reference group.

[41]Previous research supports the use of effective income as a continuous variable, which is calculated by estimating household income as the midpoint of each income bracket and dividing it by the household size (see e.g., Buhmann & Rainwater, 1988; Plantinga, Breugelmans, & Zeelenberg, 2018).

Table 5. *Demographic control variables*

Topic	Question	Possible responses
Gender	1. What is your gender?	Multiple choice: • Male • Female • Other
Age	2. What is your age?	Open response
Education	3. What is the highest level of education that you have completed?	Multiple choice: • I have no formal qualifications • GCSE/O-Level/CSE • Vocational qualifications such as Apprenticeships or City and Guilds • A-Level, Scottish Higher, Welsh Baccalaureate, International Baccalaureate or equivalent • Diplomas in higher education, HNC/HND/BTEC Higher or equivalent • First degree level qualification (including Foundation degree, Bachelor Degree, PGCE or equivalent) • University higher degree (e.g. Masters/PhD or equivalent) • Other
Occupation	4. What is your current employment status? If more options apply, please indicate the most applicable option.	Multiple choice: • Employed full-time (for 30 or more hours per week) • Employed part-time (for less than 30 hours per week) • Self-employed full-time (for 30 or more hours per week) • Self-employed part-time (for less than 30 hours per week) • Unemployed and looking for work • Unemployed and not looking for work • Retired • Semi-retired (drawing a pension or other income sources but still working) • Student • Permanently sick/ disabled • Looking after the home • Other
Subjective socioeconomic status	5. Think of a ladder as representing where people stand in the United Kingdom. At the top of the ladder are the people who have the most money, most education, and most respected jobs. At the bottom are the people who have the least money, least education, and least respected jobs or no job. The higher up you are on this ladder, the closer you are to the people at the very top, and the lower you are, the closer you are to the people at the very bottom. Where would you place yourself on this ladder?	Slider ranging from 1 to 10. 

		Please select the rung where you think you stand at this time in your life (10 being the top rung) relative to other people in the United Kingdom.	
Effective income_1	6.	Which band from the grid below does your household's total gross income from all sources fall into? "Income" is any money from work, including a second job or occasional work, and any other sources, such as benefits, pensions, savings and investments, maintenance payments and rent from property or subletting. "Gross" means the amount you receive before any deductions, income tax, National Insurance etc.	Multiple choice: • up to £86 per week/ up to £374 per month/ under £4,500 per year • £87-£124 per week/ £375-£541 per month/ £4,500-6,499 per year • £125-£143 per week/ £542-£624 per month/ £6,500-£7,499 per year • £144-£182 per week/ £625-£791 per month/ £7,500-£9,499 per year • £183-£220 per week/ £792-£957 per month/ £9,500-£11,499 per year • £221-£259 per week/ £958-£1,124 per month/ £11,500-£13,499 per year • £260-£297 per week/ £1,125-£1,291 per month/ £13,500-£15,499 per year • £298-£336 per week/ £1,292-£1,457 per month/ £15,500-£17,499 per year • £337-£384 per week/ £1,458-£1,666 per month/ £17,500-£19,999 per year • £385-£480 per week/ £1,667-£2,082 per month/ £20,000-£24,999 per year • £481-£576 per week/ £2,083-£2,499 per month/ £25,000-£29,999 per year • £577-£672 per week/ £2,500-£2,916 per month/ £30,000-£34,999 per year • £673-£768 per week/ £2,917-£3,332 per month/ £35,000-£39,999 per year • £769-£961 per week/ £3,333-£4,166 per month/ £40,000-£49,999 per year • £962-£1,441 per week/ £4,167-£6,249 per month/ £50,000-£74,999 per year • £1,442-£1,992 per week/ £6,250-£8,332 per month/ £75,000-£99,999 per year • £1,993+ per week/ £8,333+ per month/ £100,000+ per year
Effective income_2	7.	Including you, how many adults aged 18 or over are currently living in your household?	Open response
Effective income_3	8.	How many children aged 17 or under are financially dependent on you and/or your partner/spouse? Please include all children, whether they currently live with you or not.	Open response

Note. The used education categories represent the education categories commonly used in the United Kingdom (see MAS, 2018). GCSE/O-Level/CSE represents lower secondary education, Vocational qualifications such as Apprenticeships or City and Guilds represents secondary vocational education, A-Level, Scottish Higher, Welsh Baccalaureate, International Baccalaureate or equivalent represents upper secondary education, Diplomas in higher education, HNC/HND/BTEC Higher or equivalent represents higher professional education, First degree level qualification (including Foundation degree, Bachelor Degree, PGCE or equivalent) represents

undergraduate university education, University higher degree (e.g. Masters/PhD or equivalent) represents postgraduate university education.

Data analysis

Missing values. Between 0.2% (financial self-efficacy) and 35% (positive financial behaviors) of the data were missing. As shown by Little's (1988) test, χ^2 = 6,644.37, *df* = 6,386, *p* = .012, the data were not missing completely at random. Following the approach of Von Hippel (2018), we used multiple imputations with twenty-six plausible datasets[42] based on a Markov Chain Monte Carlo (MCMC) method known as fully conditional specification (FCS).

Path analysis. We used the pathj module of the open-source jamovi statistical platform (Gallucci, 2019; The jamovi project, 2021), based on the lavaan R package (Rosseel, 2012), for our path analyses. This method enabled us to test the compatibility of our conceptual moderated mediation model (see Fig. 1) with our dataset. Results consisted of indirect, direct, and total effects (Jeon, 2015). Indirect effects were the relations between the independent and the dependent variables that operated via the intermediate variable. Direct effects were the relations between the independent and the dependent variables, *ceteris paribus*. Total effects were the sum of direct and indirect effects. All effects were standardized coefficients estimated through maximum likelihood.

We developed a path analysis using executive functioning and financial self-efficacy as the independent variables, positive financial behaviors as the intermediate variable, and current financial stress and expected future financial security as the dependent variables, and tested Hypothesis 1 and Hypothesis 2. This path analysis also included subjective

[42]The number of imputations was calculated as follows: $M = 1 + \frac{1}{2}\left(\frac{FMI}{CV(SE)}\right)^2$, where FMI is the fraction of missing information and $CV(SE)$ is the percentage that the standard error estimate is allowed to change if the data were imputed again. In the present study, FMI = 35% and $CV(SE)$ = 5%, resulting in M = 25 or 26.

socioeconomic status, age, effective income, and occupation together as the control variables.[43] Subsequently, we incorporated the interaction of executive functioning and financial self-efficacy in the path analysis, and tested Hypothesis 3a and Hypothesis 3b.

Results

Correlation results

Table 6 depicts the correlation coefficients of all study variables. A correlation analysis revealed that almost all individual variables (i.e., executive functioning, financial self-efficacy, subjective socioeconomic status, age, education, effective income, and occupation) were significantly related to current financial stress, expected future financial security, and/or positive financial behaviors ($p < .05$), except for gender ($r = .09$, $p = .063$, $r = -.08$, $p = .095$, and $r = -.09$, $p = .072$, respectively). Among the independent variables, the analysis also showed that no multicollinearity problems were present (see e.g., Landau & Everitt, 2004).[44]

[43]We excluded gender because the correlation analysis revealed that it did not have a significant relation with neither the dependent variables (current financial stress and future financial security) nor the intermediate variable (positive financial behaviors). In addition, our preliminary path analysis including subjective socioeconomic status, age, effective income, occupation, and education together as control variables showed high correlation among the dummies for occupation and education. Therefore, it was not possible to use this model with all these control variables together. Consequently, we tested one model excluding occupation only and another model excluding education only. These analyses revealed that occupation was a significant predictor of financial well-being, whereas education was not. Thus, we report the model excluding education in the current study.

[44]This result was verified by the Variance Inflation Factors (VIF) below 2.

Table 6. *Correlation results of all study variables*

Variable	2	3	4	5	6	7	8	9	10	11
19. Current financial stress	**-.68**	**-.65**	**-.38**	**-.41**	**-.50**	.09	**-.30**	**-.13**	**-.26**	-.05
20. Expected future financial security	—	**.60**	**.33**	**.38**	**.52**	-.08	**.23**	**.18**	**.30**	.01
21. Positive financial behaviors		—	**.23**	**.41**	**.38**	-.09	.07	**.20**	**.36**	**-.19**
22. Executive functioning			—	**.29**	**.28**	.02	**.29**	.09	.09	.01
23. Financial self-efficacy				—	**.23**	-.09	.06	**.20**	**.19**	**-.16**
24. Subjective socioeconomic status					—	-.03	**.25**	**.27**	**.43**	-.01
25. Gender						—	.02	.08	**-.11**	**.30**
26. Age							—	**-.15**	-.07	**.30**
27. Education								—	**.34**	**.17**
28. Effective income									—	**-.33**
29. Occupation										—

Note. Pearson's correlation coefficients among the continuous variables, point-biserial correlation coefficients between the categorical and the continuous variables, and Cramer's V among the categorical variables were calculated. Statistically significant correlations are printed in bold ($p < .05$).

Path analysis results

Because the interaction of executive functioning and financial self-efficacy did not have a significant contribution on positive financial behaviors (β = -.05, z = 1.33, *p* = .182) and financial well-being (current financial stress: β = -.00, z = 0.09, *p* = .930 and expected future financial security: β = .01, z = 0.25, *p* = .799), we excluded it. Hence, we only report the results for executive functioning and financial self-efficacy as separate predictors of financial well-being below.

Tables 7-10 report the standardized coefficients obtained from the path analysis when controlling for demographic variables (i.e., subjective socioeconomic status, age, effective income, and occupation).

Executive functioning and financial self-efficacy as predictors of current financial stress

Indirect effects on current financial stress. Results showed that there was no significant indirect relation found for executive functioning (β = -.03, z = 1.23, *p* = .218; see Table 7). Conversely, financial self-efficacy had a negative indirect relation with current financial stress via positive financial behaviors (β = -.14, z = 5.66, *p* < .001). A subsequent analysis of the component effects showed that financial self-efficacy had a positive association with positive financial behaviors (β = .29, z = 6.42, *p* < .001), which, in turn, had a negative relationship with current financial stress (β = -.49, z = 12.47, *p* < .001; see Table 8). These results provide no support for Hypothesis 1, but do support Hypothesis 2.

Direct effects on current financial stress. Results showed that both executive functioning (β = -.12, z = 3.18, *p* = .001) and financial self-efficacy (β = -.13, z = 3.60, *p* = <.001) had direct negative relations with current financial stress (see Table 7).

Total (indirect plus direct) effects on current financial stress. Results showed that executive functioning was a less strong predictor of current financial stress (β = -.15, z = 3.42, $p < .001$) than financial self-efficacy (β = -.27, z = 6.84, $p < .001$; see Table 7).

Among the demographic control variables, subjective socioeconomic status (β = -.29, z = 5.83, $p < .001$) and effective income (β = -.09, z = 2.09, $p = .037$) were negatively related to current financial stress (see Table 7). Regarding occupation, unemployed respondents reported less current financial stress than those who were employed full-time (β = -.15, z = 2.77, $p = .006$).

Table 7. *Indirect, direct, and total effects on current financial stress*

Variable	Standardized effects	z	95% CI	
			Lower	Upper
Indirect effects				
Executive functioning=>Positive financial behaviors=>Current financial stress	-.03	1.23	-0.07	0.02
Financial self-efficacy=>Positive financial behaviors=>Current financial stress	-.14***	5.66	-0.19	-0.09
Direct effects				
Executive functioning=>Current financial stress	-.12**	3.18	-0.20	-0.05
Financial self-efficacy=>Current financial stress	-.13***	3.60	-0.20	-0.06
Total effects				
Executive functioning=>Current financial stress	-.15***	3.42	-0.24	-0.07
Financial self-efficacy=>Current financial stress	-.27***	6.84	-0.35	-0.19
Subjective socioeconomic status=>Current financial stress	-.29***	5.83	-0.24	-0.12
Age=>Current financial stress	-.10	1.87	-0.01	0.00
Effective income=>Current financial stress	-.09*	2.09	-0.00	-0.00
Not employed for other reasons=>Current financial stress	-.03	0.54	-0.31	0.18
Employed part-time=>Current financial stress	-.05	1.20	-0.47	0.12
Self-employed=>Current financial stress	.05	1.13	-0.16	0.53
Unemployed=>Current financial stress	-.15**	2.77	-0.64	-0.11
(Semi-)retired=>Current financial stress	-.04	0.89	-0.36	0.13

Note. Employed full-time was the reference group. The indirect effects were estimated covariating the control variables. Confidence Intervals (CI) are computed with the Bootstrap percentiles method. Indirect and direct effects for the control variables are available upon request. * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 8. *Component effects on current financial stress*

Variable	Standardized effects	z	95% CI	
			Lower	Upper
Executive functioning=>Positive financial behaviors	.05	1.24	-0.04	0.14
Positive financial behaviors=>Current financial stress	-.49***	12.47	-0.58	-0.42
Financial self-efficacy=>Positive financial behaviors	.29***	6.42	0.19	0.37

Note. Confidence Intervals (CI) are computed with the Bootstrap percentiles method. Component effects of the control variables are available upon request. *** $p < .001$.

Executive functioning and financial self-efficacy as predictors of expected future financial security

Indirect effects on expected future financial security. Results showed no significant indirect relation for executive functioning (β = .02, z = 1.23, p = .218; see Table 9). Conversely, financial self-efficacy had a positive indirect relation with expected future financial security via positive financial behaviors (β = .12, z = 5.22, p < .001). A subsequent analysis of the component effects showed that financial self-efficacy had a positive association with positive financial behaviors (β = .29, z = 6.42, p < .001), which, in turn, had a positive relationship with expected future financial security (β = .42, z = 9.51, p < .001; see Table 10). Again, these results provide no support for Hypothesis 1, but do support Hypothesis 2.

Direct effects on expected future financial security. Results showed that both executive functioning (β = .09, z = 2.27, p = .023) and financial self-efficacy (β = .12, z = 2.79, p = .005) had direct positive relations with expected future financial security (see Table 9).

Total (indirect plus direct) effects on expected future financial security. Results showed that executive functioning was a less strong predictor of expected future financial security (β = .11, z = 2.59, p = .010) than financial self-efficacy (β = .24, z = 5.81, p < .001; see Table 9).

Among the demographic control variables, subjective socioeconomic status (β = .32, z = 6.38, p < .001) and effective income (β = .11, z = 2.34, p = .019) were positively related to expected future financial security (see Table 9). Regarding occupation, unemployed

respondents reported more expected future financial security than those who were employed full-time ($\beta = .19$, $z = 3.62$, $p < .001$).

Table 9. *Indirect, direct, and total effects on expected future financial security*

Variable	Standardized effects	z	95% CI	
			Lower	Upper
Indirect effects				
Executive functioning=>Positive financial behaviors=>Expected future financial security	.02	1.23	-0.02	0.06
Financial self-efficacy=>Positive financial behaviors=>Expected future financial security	.12***	5.22	0.08	0.17
Direct effects				
Executive functioning=>Expected future financial security	.09*	2.27	0.01	0.16
Financial self-efficacy=>Expected future financial security	.12**	2.79	0.03	0.20
Total effects				
Executive functioning=>Expected future financial security	.11*	2.59	0.03	0.20
Financial self-efficacy=>Expected future financial security	.24***	5.81	0.16	0.32
Subjective socioeconomic status=>Expected future financial security	.32***	6.38	0.14	0.26
Age=>Expected future financial security	.00	0.08	-0.01	0.01
Effective income=>Expected future financial security	.11*	2.34	0.00	0.00
Not employed for other reasons=>Expected future financial security	-.04	0.77	-0.35	0.15
Employed part-time=>Expected future financial security	.02	0.45	-0.25	0.42
Self-employed=>Expected future financial security	-.07	1.29	-0.67	0.15
Unemployed=>Expected future financial security	.19***	3.62	0.24	0.73
(Semi-)retired=>Expected future financial security	-.01	0.30	-0.33	0.22

Note. Employed full-time were the reference groups. The indirect effects were estimated covariating the control variables. Confidence Intervals (CI) are computed with the Bootstrap percentiles method. Indirect and direct effects for the control variables are available upon request. * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 10. *Component effects on expected future financial security*

Variable	Standardized effects	z	95% CI	
			Lower	Upper
Executive functioning=>Positive financial behaviors	.06	1.24	-0.04	0.14
Positive financial behaviors=>Expected future financial security	.42***	9.51	0.34	0.52
Financial self-efficacy=>Positive financial behaviors	.29***	6.42	0.19	0.37

Note. Confidence Intervals (CI) are computed with the Bootstrap percentiles method. Component effects of the control variables are available upon request. *** $p < .001$.

Discussion

In the present, preregistered, study using a representative sample of the UK population, we tested the hypotheses that both executive functioning (Hypothesis 1) and financial self-efficacy (Hypothesis 2) are associated with financial well-being (current financial stress and expected future financial security) via positive financial behaviors. We also hypothesized that financial self-efficacy moderated the indirect relation of executive functioning with financial well-being (Hypothesis 3a) and that executive functioning moderated the indirect relation of financial self-efficacy with financial well-being (Hypothesis 3b). Below, we discuss the main results, contributions, implications, and limitations of this study.

Summary of results and contributions

We found that executive functioning did not predict current financial stress and expected future financial security via positive financial behaviors, thereby not supporting Hypothesis 1. This finding corroborates some studies that showed no relation of executive functioning with neither positive financial behaviors nor financial well-being (Strömbäck et al., 2020), but contradicts others that showed positive relations (Drever et al., 2015).

We did obtain support for Hypothesis 2, as we found that financial self-efficacy predicted both current financial stress and expected future financial security via positive financial behaviors. This finding is in line with research that demonstrated a positive association of financial self-efficacy with positive financial behaviors (Farrell et al., 2016) and financial well-being (Sabri et al., 2020), respectively. Based on a comprehensive qualitative research, CFPB (2015) expressed that executive functioning and financial self-efficacy are important ingredients to better financial behaviors and, through these behaviors, support financial well-being. Our results add to the literature by empirically confirming this

path for financial self-efficacy, but not for executive functioning. In addition, Kempson et al. (2017) claimed that financial confidence plays an important role in predicting financial well-being. Our results add to the literature by showing that this is also the case for financial self-efficacy, which is a concept related but not similar to confidence.

It should be noted, however, that perceived self-efficacy was assessed within a financial context, whereas executive functioning was measured in relation to a broader, more general context. One might argue that the obtained difference in predictive power between self-efficacy and executive functioning reflects this difference in specificity, whereby more specific factors are stronger predictors of more specific behaviors (see e.g., Xiao, Tang, & Shim, 2008). Future research could address this issue by including a more specific assessment of executive functions.

Our results did not show that executive functioning and financial self-efficacy interacted to predict financial well-being, thus providing no support for Hypothesis 3a and Hypothesis 3b. Perhaps it reflects that the roles of these two factors in relation to both financial behavior and financial well-being are independent from each other. This suggestion may stimulate more research on this topic, for example, to assess whether the result depends on the socioeconomic context in question.

Furthermore, our results showed that financial self-efficacy and executive functioning were directly related to both current financial stress and expected future financial security. These results echo existing work that used an overall measure of financial well-being (Drever et al., 2015; Sabri et al., 2020) and extend it by showing that the direct relations applied to both dimensions of financial well-being.

In addition to the observed relationships discussed above, more exploratory analyses showed that subjective socioeconomic status, effective income, and unemployment were negatively related to current financial stress, but positively related to expected future

financial security. Intuitively, the higher the effective income of individuals, the easier they can meet their short-term financial obligations (e.g., rent, food) and save to meet their distant financial goals (e.g., house, car). As a result, they may experience less current financial stress and expect more future financial security. Similarly, the better off individuals perceive themselves in material terms compared to their peers, the less they will worry about their current financial state and the more they will work toward achieving a good future financial state. This may lead to less current financial stress and more expected future financial security. Although the result for unemployment might seem surprising, it probably reflects the fact that the UK offers a social security benefits system to unemployed individuals, which ensures that their living expenses are covered, leading them to experience less current financial stress and expect more future financial security.

Implications for financial practitioners and service providers

Overall, financial self-efficacy strongly contributes to financial well-being, and does so both directly and through positive financial behaviors. Executive functioning, on the other hand, has no indirect relation with financial well-being via positive financial behaviors, but only a moderate direct relation with financial well-being. Because financial self-efficacy and executive functioning have unequal associations with financial well-being, financial practitioners should take this into account when incorporating these factors in their interventions and practices. For example, it seems that executive functioning is not supportive of positive financial behaviors. Future research can expand our findings which were based on a UK sample by testing the studied relations within other socioeconomic and cultural contexts.

The fact that we found executive functioning to be a less strong predictor of financial well-being than financial self-efficacy may indicate that belief in one's decision-making

abilities is more germane to financial behavior and financial well-being than the abilities themselves. Research has indicated that it is easier to help individuals and families develop their beliefs in their capacities than their actual capacities (Dweck, 2006). Nevertheless, financial practitioners should be careful when focusing on beliefs, to prevent individuals from becoming overly self-efficacious. Earlier work has shown that individuals with strong beliefs but weak actual abilities display poor financial behaviors, such as skipping mortgage payments and taking informal debt (Balasubramnian & Sargent, 2020).

According to Bandura (1997), four sources contribute to one's self-efficacy: (a) performance accomplishments, (b) vicarious experience, (c) verbal persuasion, and (d) emotional arousal. Performance accomplishments regard how individuals and families learn from their successes and failures when engaging in a task or striving to meet a goal. For example, if individuals have tried to stick to a budget several times and failed to do so, they might quit performing this behavior. Financial practitioners can help these clients by creating a budget together with them and monitoring their behavior during the subsequent weeks. Financial service providers can also offer tools, such as budget apps in this case. Vicarious experience concerns how individuals and families replicate the behaviors of those around them, whom they view as their role models. Financial practitioners can facilitate their clients' financial behavior by posting about actual financial experiences and lessons learned via social media channels. And service providers can present their clients with actual anonymous client cases to help them understand the pros and cons of financial products and services.

Verbal persuasion refers to how individuals and families are motivated by others. Financial practitioners may wish to monitor their clients on a consistent basis to motivate them to continue performing a positive behavior that they have been lacking. Likewise, service providers can incentivize their clients to purchase financial products or services that are a better fit for their unique situation. Emotional arousal involves how individuals and

families' emotions influence how they perform a task or strive to achieve a goal. Financial practitioners can help their clients realize that they should avoid making financial decisions when they are emotional. Similarly, service providers should advise their clients to avoid purchasing financial products and services when they are emotional.

The above strategies will likely benefit individuals and families' financial self-efficacy and perhaps even more if practitioners and service providers work together. Said strategies are supported by prior research explaining that Bandura's sources are all effective ways to improve financial self-efficacy (Tharp, 2018).

Limitations and suggestions for future research

The present study comes with some limitations. First, as our study design has a correlational nature, we cannot confirm causal relationships. For instance, it could be that executive functions and financial self-efficacy increase financial well-being, but it could also be that the causal relationship is in the opposite direction. For example, previous research has indicated that financial scarcity impedes executive functions (Mani, Mullainathan, Sharif, & Zhao, 2013). Moreover, it could be that the relationships of executive functioning and financial efficacy with financial well-being are bi-directional and reinforce each other. For instance, high financial self-efficacy may lead to greater financial well-being, which, in turn, heightens financial self-efficacy, leading to a further increase in financial well-being. Future research could examine the possible causal relationships between executive functions, financial self-efficacy, and financial well-being by conducting, for example, longitudinal studies (e.g., Downward, Rasciute, & Kumar, 2020).

Second, in the present study executive functioning was assessed with a self-rating scale. In future studies, executive functioning might be assessed using a cognitive performance task, such as the hearts and flowers task, which measures working memory,

inhibitory control, and cognitive flexibility (Diamond, Barnett, Thomas, & Munro, 2007). Additionally, in the current research, we measured executive functions more generally, and not related to a specific domain. It would be interesting to examine whether the relationship between executive functions and financial well-being is stronger, when these cognitive abilities are measured specifically within the financial domain. For example, one could replace the item "It takes a lot of effort for me to remember things" with "It takes a lot of effort for me to remember things regarding my finances".

Third, the assessed positive financial behaviors were self-reported. Future research could assess actual financial behaviors, for example, by monitoring individuals' budgeting, spending, saving, and investing behaviors per week, month, or year (e.g., Ameriks, Caplin, & Leahy, 2004). Researchers, however, should be aware that collecting such data could be a challenge because (a) individuals may find it cumbersome to keep track of their financial habits, especially if they are not used to it, and (b) individuals may argue that this information is personal and confidential and, therefore, not participate in the study.

Conclusions

Financial well-being has positive implications for individuals, families, organizations, and the society and these implications are not limited to the financial realm. Therefore, financial practitioners and service providers, among others, must know what factors determine financial well-being, to develop strategies to help individuals and families achieve and maintain it. Our study contributes to the current literature by providing new insights on how executive functioning and financial self-efficacy predict subjective financial well-being.

Practitioners are recommended to assign an important role to financial self-efficacy in their interventions and practices (insofar this has not been done yet), as it seems to be a key factor to better both financial behaviors and financial well-being. Given the moderate

contribution of executive functioning, practitioners are advised to draw attention to this factor if they notice that their clients lack higher-order thinking. Service providers are encouraged to collaborate with practitioners and offer a supporting role in this process, as described earlier. We suggest testing the effectiveness of these potential avenues for interventions and practices as soon as possible. This will enable practitioners to continue improving their strategies, to ensure that individuals and families enjoy the highest financial well-being possible.

References

Ameriks, J., Caplin, A., & Leahy, J. (2004). The absent-minded consumer (NBER Working Paper No. 10216). Retrieved from National Bureau of Economic Research website: https://www.nber.org/system/files/working_papers/w10216/w10216.pdf

Balasubramnian, B., & Sargent, C. S. (2020). Impact of inflated perceptions of financial literacy on financial decision making. *Journal of Economic Psychology, 80*, 102–306. https://doi.org/10.1016/j.joep.2020.102306

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*(2), 191–215. https://doi.org/10.1037/0033-295X.84.2.191

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman

Banik, A., Schwarzer, R., Knoll, N., Czekierda, K., & Luszczynska, A. (2018). Self-efficacy and quality of life among people with cardiovascular diseases: A meta-analysis. *Rehabilitation Psychology, 63*(2), 295−312. https://doi.org/10.1037/rep0000199

Bari, A. F., Yunanto, A., & Shaferi, I. (2020). The role of financial self efficacy in moderating relationships financial literacy and financial management behavior. *International Sustainable Competitiveness Advantage, 10*(1), 51–60.

Brown, T. E., & Landgraf, J. M. (2010). Improvements in executive function correlate with enhanced performance and functioning and health-related quality of life: Evidence from 2 large, double-blind, randomized, placebo-controlled trials in ADHD. *Postgraduate Medicine, 122*(5), 42−51.

Brüggen, E., Hogreve, J., Holmlund, M., Kabadayi, S., & Lofgren, M. (2017). Financial well-being: A conceptualization and research agenda. *Journal of Business Research, 79*, 228–237. https://doi.org/10.1016/j.jbusres.2017.03.013

Buhmann, B., & Rainwater, L. (1988). Equivalence scales, well-being, inequality, and poverty: Sensitivity estimates across ten countries using the Luxembourg Income Study (LIS) database. *Review of Income and Wealth, 34*, 115–142. https://doi.org/10.1111/j.1475-4991.1988.tb00564.x

CFPB (Consumer Protection Financial Bureau). (2015). Financial well-being: The goal of financial education (Research Report). Retrieved from CFPB website: https://files.consumerfinance.gov/f/201501_cfpb_report_financial-well-being.pdf

CFPB (Consumer Protection Financial Bureau). (2018). Pathways to financial well-being: The role of financial capability (Research Report). Retrieved from CFPB website: https://files.consumerfinance.gov/f/documents/bcfp_financial-well-being_pathways-role-financial-capability_research-brief.pdf

Collins, A., & Koechlin, E. (2012). Reasoning, learning, and creativity: Frontal lobe function and human decision-making. *PLoS Biology, 10*(3), 1–16. https://doi.org/10.1371/journal.pbio.1001293

Dew, J., & Xiao, J. J. (2011). The Financial Management Behavior Scale: Development and validation. *Journal of Financial Counseling and Planning, 22*(1), 43–59.

Diamond, A. (2013). Executive Functions. *Annual Review of Psychology, 64*, 135–168. http://dx.doi.org/10.1146/annurev-psych-113011-143750

Diamond A., Barnett S., Thomas J., & Munro S. (2007). Preschool program improves cognitive control. *Science, 318*, 1387–1388. https://doi.org/10.1126/science.1151148

Downward, P., Rasciute, S., & Kumar, H. (2020). Health, subjective financial situation and well-being: a longitudinal observational study. *Health and Qualily of Life Outcomes, 18*(203), 1–9. https://doi.org/10.1186/s12955-020-01456-3

Drever, A. I., Odders-White, E., Kalish, C. W., Else-Quest, N. M., Hoagland, E. M., and Nelms, E. N. (2015). Foundations of financial well-being: Insights into the role of executive function, financial socialization, and experience-based learning in childhood and youth. *Journal of Consumer Affairs, 49*, 13–38. https://doi.org/10.1111/joca.12068

Dweck, C. S. (2006). *Mindset: The new psychology of success*. New York: Random House.

Fairchild, G., Van Goozen, S. H. M., Calder, A. J., Stollery, S. J., & Goodyer, I. M. (2009). Deficits in facial expression recognition in male adolescents with early-onset or adolescence-onset conduct disorder. *Journal of Child Psychology and Psychiatry, 50*, 627–636. https://doi.org/10.1111/j.1469-7610.2008.02020.x.

Farrell, L., Fry, T. R. L., & Risse, L. (2016). The significance of financial self-efficacy in explaining women's personal finance behaviour. *Journal of Economic Psychology, 54*, 85–99. https://doi.org/10.1016/j.joep.2015.07.001

Forbes, J., & Kara, S. M. (2010). Confidence mediates how investment knowledge influences investing self-efficacy. *Journal of Economic Psychology, 31*(3), 435–443. https://doi.org/10.1016/j.joep.2010.01.012

Gallucci, M. (2019). jAMM: jamovi Advanced Mediation Models [Computer software]. Retrieved from https://jamovi-amm.github.io/

Gutter, M., & Copur, Z. (2011). Financial behaviors and financial well-being of college students: Evidence from a national survey. *Journal of Family and Economic Issues, 32*, 699–714. https://doi.org/10.1007/s10834-011-9255-2

Iramani, R., & Lutfi, L. (2021). An integrated model of financial well-being: The role of financial behavior. *Accounting, 7*(1), 691–700. https://doi.org/10.5267/j.ac.2020.12.007

Jeon, J. (2015). The strengths and limitations of the statistical modeling of complex social phenomenon: Focusing on SEM, path analysis, or multiple regression models. *International Journal of Social, Behavioral, Educational, Economic, Business and Industrial Engineering, 9*(5), 1629–1637. https://doi.org/10.5281/zenodo.1105869

Kempson, E., Finney, A., & Poppe, C. (2017). *Financial well-being: A conceptual model and preliminary analysis*. Oslo: Consumption Research Norway.

Kempson, E., & Poppe, C. (2018). *Understanding financial well-being and capability - A revised model and comprehensive analysis*. Oslo: Consumption Research Norway.

Kim, K. T., Anderson, S. G., & Seay, M.C. (2019). Financial knowledge and short-term and long-term financial behaviors of Millennials in the United States. *Journal of Family and Economic Issues, 40*(2), 194–208. https://doi.org/10.1007/s10834-018-9595-2

Krekel, C., Ward, G., & De Neve, J. (2019). Employee wellbeing, productivity and firm performance (CEP Discussion Paper No. 1605). Retrieved from Center for Economic Performance website: https://cep.lse.ac.uk/pubs/download/dp1605.pdf

Landau, S., & Everitt, B. S. (2004). *A handbook of statistical analyses using SPSS.* Boca Raton, Florida: Chapman and Hall.

Lapp, W. M. (2010). Behavior models for prosperity: A statistical assessment of savings and behavioral change (EARN Research Brief). Retrieved from Earned Assets Resource Network website: https://www.earn.org/wp-content/uploads/2015/03/5_-_Behavioral_Models_for_Prosperity-_A_Statistical_Assessment_of_Savings_and_Behavioral_Change-1.pdf

Limbu, Y. B., & Sato, S. (2019). Credit card literacy and financial well-being of college students: A moderated mediation model of self-efficacy and credit card number. *International Journal of Bank Marketing, 37*(4), 991–1003. https://doi.org/10.1108/IJBM-04-2018-0082

Little, R. J. A. (1988). A test of missing completely at random for multivariate data with missing values. *Journal of the American Statistical Association, 83*(404), 1198–1202. https://doi.org/10.1080/01621459.1988.10478722

Mani, A., Mullainathan, S., Shafir, E., & Zhao, J. (2013). Poverty impedes cognitive function. *Science, 341*, 976–980. http://dx.doi.org/10.1126/science.1238041

MAS (Money Advice Service). (2018). Financial Capability Survey 2018 (Technical Report). Retrieved from MAS website: https://www.fincap.org.uk/en/articles/financial-capability-survey

Miller, H. V., Barnes, J. C., & Beaver, K. M. (2011). Self-control and health outcomes in a nationally representative sample. *American Journal of Health Behavior, 35*(1), 15–27. https://doi.org/10.5993/AJHB.35.1.2

Montford W., & Goldsmith, R. E. (2016). How gender and financial self-efficacy influence investment risk taking. *International Journal of Consumer Studies, 40*(1), 101–106. https://doi.org/10.1111/ijcs.12219

Netemeyer, R. G., Warmath, D., Fernandes, D., & Lynch, J. G. (2018). How am i doing? Perceived financial well-being, its potential antecedents, and its relation to overall well-being. *Journal of Consumer Research, 45*(1), 68–89. https://doi.org/10.1093/jcr/ucx109.

Peterson, G. W., & Bush, K. R. (2013). *Handbook of marriage and the family*. Springer. https://doi.org/10.1007/978-1-4614-3987-5

Plantinga, A., Krijnen, J. M. T., Zeelenberg, M., & Breugelmans, S. M. (2018). Evidence for opportunity cost neglect in the poor. *Journal of Behavioral Decision Making, 31*(1), 65–73. https://doi.org/10.1002/bdm.2041

Qamar, M. A. J., Khemta, M. A. N., & Jamil, H. (2016). How knowledge and financial self-efficacy moderate the relationship between money attitudes and personal financial management behavior. *European Online Journal of Natural and Social Sciences, 5*(2), 296–308.

Riitsalu, L., & Murakas, R. (2019). Subjective financial knowledge, prudent behaviour and income: The predictors of financial well-being in Estonia. *International Journal of Bank Marketing, 37*(4), 934−950. https://doi/org/10.1108/IJBM-03-2018-0071

Riitsalu, L., & Van Raaij, F. (2020). Self-control, future time perspective and savings: The keys to perceived financial well-being (Research Report). Retrieved from Think Forward Initiative website: https://www.thinkforwardinitiative.com/research/self-control-future-time-perspective-and-savings-the-keys-to-perceived-financial-well-being

Rimal, A., & Moon, W. (2009). Self-efficacy a mediator of the relationship between dietary knowledge and behavior. *Journal of Food Distribution Research, 42*(3), 28–41. Retrieved from http://www.fdrsinc.org/wpcontent/uploads/2014/09/November-2011.pdf#page=32

Rosseel, Y. (2012). lavaan: An R Package for Structural Equation Modeling. *Journal of Statistical Software, 48*(2), 1–36. http://www.jstatsoft.org/v48/i02/

Sabri, M. F., Wijekoon, R., & Rahim, H. A. (2020). The influence of money attitude, financial practices, self-efficacy and emotion coping on employees' financial wellbeing. *Management Science Letters, 10*(4), 889–900. https://doi:10.5267/j.msl.2019.10.007

Selvia, G., Rahmayanti, D., Afandy, C., & Zoraya. I. (2020). The effect of financial knowledge, financial behavior and financial inclusion on financial well-being. *Proceedings of the 3rd Beehive International Social Innovation Conference*, https://doi.org/10.4108/eai.3-10-2020.2306600

Serido, J., & Shim, S. (2017). Adult financial capability, stability and well-being (Research Report). Retrieved from APLUS website: https://static1.squarespace.com/static/597b61a959cc68be42d2ee8c/t/598a844ecd39c31515c51c7f/1502250072075/APLUS_WAVE4.pdf

Strömbäck, C., Skagerlund, K., Västfjäll, D., & Tinghög, G. (2020). Subjective self-control but not objective measures of executive functions predicts financial behavior and well-being. *Journal of Behavioral and Experimental Finance, 27*, 1–7. https://doi.org/10.1016/j.jbef.2020.100339

Tahmassian, K., & Moghadam, N. J. (2011). Relationship between self-efficacy and symptoms of anxiety, depression, worry and social avoidance in a normal sample of students. *Iranian Journal of Psychiatry and Behavioral Sciences, 5*, 91–98.

Tharp, D. (2018, February 7). Why financial self-efficacy is crucial to financial success. *Kitces.* https://www.kitces.com/blog/financial-self-efficacy-bandura-positive-psychology-planning-perma/

The jamovi project (2021). jamovi. (Version 1.6) [Computer Software]. Retrieved from https://www.jamovi.org.

Van der Elst, W., Ouwehand, C., Van der Werf, G., Kuyper, H., Lee, N., & Jolles, J. (2012). The Amsterdam Executive Function Inventory (AEFI): Psychometric properties and demographically-corrected normative data. *Journal of Clinical and Experimental Neuropsychology, 34*, 160–171.

Van Dijk, W. W., Van der Werf, M., & Van Dillen, L. F. (2021). The Psychological Inventory of Financial Scarcity (PIFS): A Psychometric Evaluation. *Manuscript submitted for publication.*

Von Hippel, P. (2018). How many imputations do you need? A two-stage calculation using a quadratic rule. *Sociological Methods & Research, 49*(3), 1–17. https://doi/org/10.1177/0049124117747303

Vosloo, W., Fouché, J., Barnard, J. (2014). The relationship between financial efficacy, satisfaction with remuneration and personal financial well-being. *International Business & Economics Research Journal, 13*(6), 1455–1470. https://doi.org/10.19030/iber.v13i6.8934

Wagner, J., & Walstad, W. B. (2018). The effects of financial education on short-term and long-term financial behaviors. *The Journal of Consumer Affairs, 53*(1), 234–259.

Wilmarth, M. J. (2020). Financial and Economic Well-Being: A Decade Review from Journal of Family and Economic Issues. *Journal of Family and Economic Issues.* https://doi.org/10.1007/s10834-020-09730-8

Xiao, J. J., Tang, C., & Shim, S. (2008). Acting for happiness: Financial behavior and life satisfaction of college students. *Social Indicators Research, 92,* 53–68. https://doi.org/10.1007/s11205-008-9288-6

Chapter 6

Summary and conclusion

Making sound financial decisions is crucial in modern society, and these decisions might be becoming increasingly difficult, because people face more and more challenges, such as technological progress in the financial environment and complex financial products and services (Simonse, Van der Werf, & Wilmink, 2017). As a consequence, people can experience problems with managing their money, even in well-developed and rich countries (Klapper, Lusardi, & Van Oudheusden, 2015). Poor financial decisions carry substantial costs for both the individuals themselves, such as adverse psychological and physical health outcomes, and the society as a whole, such as less economic growth and more unemployment (Mian, Sufi, & Verner, 2017; Van Dijk, Van der Werf, & Van Dillen, 2021). On the other hand, sound financial decisions provide benefits, like having more financial room to enjoy life (Allen, 2020), which contributes to financial satisfaction and financial well-being (CFPB. 2015). It is, therefore, imperative for policymakers, educators, practitioners, and service providers to identify what factors predict financial decisions, enabling them to develop strategies that might reduce the dire consequences of poor financial decisions while reaping the benefits of sound financial decisions. With the present dissertation, we add to this effort by testing the relations between financial knowledge, psychological factors (i.e., attitude toward money, future orientation, and control skills), and positive financial behaviours, on the one hand, and financial satisfaction and financial well-being, on the other. In this last chapter of the present dissertation, we address the key findings, implications, and lessons learned of the four empirical chapters.

Key findings, implications, and lessons learned

In Chapter 2, we tested the effectiveness of two modules of a large-scale national financial education program in Dutch primary schools (i.e., the modules Responsible Spending and Performing Transactions). It is possible to increase fifth graders' financial

knowledge and skills with a financial education module. Our findings showed that the effectiveness can differ per module. Whereas the Performing Transactions module was effective in our study, the Responsible Spending module was not. This could stem from the fact that the children who received the Responsible Spending module already knew a lot about the topic and may not have learned anything new. It, however, may also be that this module is effective for younger children (i.e., those in lower grades), who have less knowledge about the topic. Overall, these findings and implications point to two lessons for policymakers and educators. First, financial education programs, such as the one tested here, which enable children to implement what they learn using daily life examples might improve their knowledge and skills regarding certain financial competencies. Second, it is crucial to not only assess children's start level of knowledge and skills during the development stage of a program, but also talk with their parents, caregivers, or guardians to know what they have (already) been teaching the children. This way, it will be possible to create the right content for the program, and decide about the right period for teaching the program.

In Chapter 3, we tested the extent to which the four different combinations of high and low objective and subjective financial knowledge and different types of positive financial behaviours contribute to financial well-being. Objective financial knowledge encompasses people's actual understanding of the financial landscape, and subjective financial knowledge (also termed financial confidence in the current dissertation) concerns their own judgment of what they know (Lind et al., 2020). Positive financial behaviours are those behaviours that lead to effective financial decisions, such as paying bills on time and active saving. Our findings showed that only the combination of high objective and high subjective knowledge was related to more financial well-being compared to the combination of low objective and low subjective financial knowledge. Our findings also showed that some financial behaviours, namely paying bills on time, covering normal living expenses, and active saving,

were associated with more financial well-being. Whereas other financial behaviours, namely budgeting and making considered purchases, were related to less financial well-being. Striving to achieve long-term goals and keeping track of expenses were not associated with financial well-being. The non-significant result for striving to achieve long-term goals can be related to the short-term measure of financial well-being used in our study. Whereas previous research has found either a positive or a negative relationship of keeping track of expenses with financial well-being (Finney, 2016; Xiao et al., 2006, 2009), we found no significant association. It is possible that, in our Dutch sample, the profit generated from keeping track of expenses was too limited to impact the broad construct of financial well-being. The negative relation between some financial behaviours (i.e., budgeting and making considered purchases) and financial well-being can imply at least two things. First, if these behaviours are performed out of necessity, it will generate stress and discomfort, leading to less financial well-being. Second, it might be that the relationship runs in the opposite direction, meaning that some people have low financial well-being and, therefore, feel the urge to perform aforementioned behaviours. Overall, these findings and implications point to three lessons for financial practitioners and service providers to address in the design and communication of financial literacy efforts. First, these efforts should focus on both objective and subjective financial knowledge with the goal to help people achieve a high level of both. Second, the efforts should help people engage in specific financial behaviours (i.e., take action), such as paying bills on time, covering normal living expenses, and active saving. Third, it is important to help people recognize that, although some financial behaviours might be unpleasant in the short term, these could be beneficial in the long term.

In Chapter 4, we tested the extent to which objective and subjective financial knowledge, future orientation and attitude toward money, and spending self-control and perceived behavioural control predict positive financial behaviours, and, in turn, contribute to

financial satisfaction. Future orientation regards people's attitude toward planning and providing for the future (Metcalf & Zimbardo, 2016). A positive attitude toward money corresponds to people's positive view of their finances, whereby they see money as a tool to achieve their financial goals and financial success (Tracy, 2021). Spending self-control concerns people's ability to monitor and regulate their impulses to buy items (Haws, Bearden, & Nenkov, 2012). Perceived behavioural control refers to the level of control that people experience to perform a particular behaviour (Ajzen, 1985), in this study, a financial behaviour. Our findings showed that all included individual factors were associated with one or more positive financial behaviours, and in turn, with financial satisfaction. Perceived behavioural control, future orientation, and financial confidence were the strongest indirect predictors of financial satisfaction. Our findings also showed that financial confidence and future orientation were positively related to adjusting spending, whereas perceived behavioural control was negatively related to it. Similarly, future orientation was negatively related to keeping track. Adjusting spending and keeping track, in turn, were negatively associated with financial satisfaction. Furthermore, our findings showed that all individual factors (i.e., financial confidence, financial knowledge, future orientation, spending self-control, and perceived behavioural control), except attitude toward money, were also directly related to financial satisfaction. Financial confidence was the single strongest direct predictor of financial satisfaction. These results imply that all studied individual factors can increase financial satisfaction, but the strongest contribution comes from financial confidence, followed by future orientation and perceived behavioural control. The negative relation between some positive financial behaviours (i.e., adjusting spending and keeping track) and financial satisfaction can imply at least two things. First, these behaviours are not pleasant to perform, because they are time and energy consuming. Second, it might be that for some people it may be necessary to adjust their spending and check their finances frequently, for

example, because they have financial problems (Madern, 2015). Overall, these findings and implications point to three lessons for financial practitioners. First, current practices should continue to focus on financial confidence to increase people's financial satisfaction. Second, these practices should also draw attention to perceived behavioural control and future orientation. Third, it is useful to help people understand that certain financial behaviours might not be pleasant in the short term, but could be beneficial in the long term.

In Chapter 5, we tested the extent to which executive functions and financial self-efficacy predict positive financial behaviours and, in turn, contribute to financial well-being. Executive functions cover people's mental processes or cognitive skills, such as planning and organizing, which are needed to engage in goal-directed behavior (Diamond, 2013). Financial self-efficacy regards people's belief that they can complete their financial tasks and meet their financial goals (Lapp, 2010). Our findings showed that financial self-efficacy had a strong positive association with both components of financial well-being (current financial stress and future financial security) via positive financial behaviours. We did not find that executive functions were related to these components via positive financial behaviours. Moreover, our findings showed that self-efficacy and executive functioning did not interact to predict both components of financial well-being. Further findings showed that financial self-efficacy had a strong direct positive association with both components of financial well-being, while executive functioning had a moderate direct relation. These results imply that people's beliefs in their skills to engage in positive financial behaviours and achieve financial well-being are more important for financial well-being than people's actual executive skills. Still, it is crucial to focus on both the actual skills and beliefs in those skills, as the latter can be deceptive. Previous research has demonstrated that people with strong beliefs, but weak actual skills are ill-equipped to recognize their lack of sufficient competence (known as 'the Dunning-Kruger effect'; Dunning, 2011), and are more likely to exhibit poor banking

behaviour, skip mortgage payments, and engage in informal debt (Balasubramnian & Sargent, 2020). Such behaviours, resulting from overly strong efficacy beliefs, will in the long run likely have an even greater negative impact on financial well-being. Overall, these findings and implications point to an important lesson for financial practitioners and service providers. Current practices and tools should help people to achieve a high level of both financial self-efficacy and executive functioning, albeit financial self-efficacy is a stronger predictor of financial well-being than executive functioning (similar to the earlier discussed combination of high objective and high subjective financial knowledge).

Conclusion

The present dissertation adds to the current body of literature on sound financial decisions by revealing that these decisions are determined by multiple factors and germane to both financial satisfaction and financial well-being.

The most promising factors to increase financial satisfaction were financial confidence, future orientation, and perceived behavioural control, and the most promising factors to increase financial well-being were the combination of high objective and high subjective financial knowledge and financial self-efficacy. In addition to these factors, we found two observations remarkable. First, not all financial behaviours that could be intuitively regarded as positive were immediately beneficial to financial satisfaction or financial well-being. For example, results of Chapter 3 suggest that budgeting and making considered purchases could be unpleasant and, therefore, adversely affect financial well-being in the short term. Similarly, findings of Chapter 4 indicate that adjusting spending based on changing (financial) circumstances and keeping track of expenses could be painful and, hence, adversely impacted financial satisfaction in the short term. Second, not all control skills that could be expected to help people make sound financial decisions, actually do so.

For instance, in Chapter 4, we found that people with more spending self-control reported working less toward their financial goals. It is possible that these people are so focused on curbing purchase impulses, that they forget what they are doing it for, namely to create financial room to achieve their goals, such as going on vacation or buying a house. Past studies also suggest that exerting self-control might come at the expense of enjoyment. For example, people could choose to buy items that are considered virtuous instead of pleasurable (eating healthy less tasty foods instead of more tasty but unhealthy foods; Milkman, 2012). Recent research, however, questions this line of thought, because people can train themselves to obtain pleasure from virtuous consumption as well (Vosgerau, Scopelliti, & Huh, 2020).

An unanswered question is whether the aforementioned factors and observations will affect people's actual financial decisions. The next step, therefore, should be to encourage, among others, policymakers, educators, practitioners, and service providers to consider these factors and observations in their (existing and new) efforts, including educational programs and coaching practices, as well as products, services, and tools, and assess the effectiveness of these efforts to enable evidence-based improvement. In Chapter 2, for example, we tested the effectiveness of two financial education modules designed for fifth graders. Likewise, policymakers, educators, practitioners, and service providers could design and test interventions for adults that include the aforementioned factors and observations.

It is important to note that the present dissertation focused on cognitive and psychological factors. In addition to these more internal factors, people are likely also influenced by external factors, such as culture, religion, access to financial advice, economic environment, and socioeconomic status (Ciumara, 2014). For example, earlier work found that people with access to financial advice can make better financial decisions than those without (Lachance & Tang, 2012). Therefore, to establish effective interventions, it is recommended to tailor the previously discussed factors and observations based on people's

unique circumstances. Recent studies support this notion, claiming that efforts should be applicable to the specific characteristics and needs of each target group (Dare, 2020; Lusardi, 2019). With the present dissertation, we hope to provide novel insights to increase sound financial decisions and, via these decisions, also increase financial satisfaction and financial well-being. Ultimately, the goal is to help people lead happier, healthier, and more successful lives.

References

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl & J. Beckman (Eds.), *Action-control: From cognition to behavior* (pp. 11–39). Springer.

Allen, T. A. (2020, January 25). The importance of learning to make sound financial decisions early in life. *Tyler Allen.* https://tylerallen.com/the-importance-of-learning-to-make-sound-financial-decisions-early-in-life/

Balasubramnian, B., & Sargent, C. S. (2020). Impact of inflated perceptions of financial literacy on financial decision making. *Journal of Economic Psychology, 80*, 102–306. https://doi.org/10.1016/j.joep.2020.102306

CFPB (Consumer Financial Protection Bureau). (2015). *Financial well-being: The goal of financial education* (Report). Consumer Financial Protection Bureau. https://files.consumerfinance.gov/f/201501_cfpb_report_financial-well-being.pdf

Ciumara, T. (2014, May). *Factors influencing individual financial decisions: A literature review* [Conference presentation]. Globalization, Intercultural Dialogue, and National Identity (GIDNI), Târgu Mureș, Romania. https://www.researchgate.net/publication/265601246_FACTORS_INFLUENCING_INDIVIDUAL_FINANCIAL_DECISIONS_A_LITERATURE_REVIEW

Dare, S. E. (2020, November 4). Financial education: A panacea in today's modern society? *Centrale Bank van Curaçao en Sint Maarten [Central Bank of Curaçao and Sint Maarten]*. https://cdn.centralbank.cw/media/blogs/20201104_blog_nov_2020_financial_education.pdf

Diamond, A. (2013). Executive Functions. *Annual Review of Psychology, 64*, 135–168. http://dx.doi.org/10.1146/annurev-psych-113011-143750

Dunning, D. (2011). The Dunning-Kruger effect: On being ignorant of one's own ignorance. *Advances in Experimental Social Psychology, 44*, 247–296. https://doi.org/10.1016/B978-0-12-385522-0.00005-6

Haws, K. L., Bearden, W. O., & Nenkov, G. Y. (2012). Consumer spending self-control effectiveness and outcome elaboration prompts. *Journal of the Academy of Marketing Science, 40*(5), 695–710. https://doi.org.10.1007/s11747-011-0249-2

Klapper, L., Lusardi, A., & Van Oudheusden, P. (2015). *Financial Literacy around the World*. Standard & Poor's Ratings Services Global Financial Literacy Survey.

Lachance, M. E. & Tang, N., (2012). Financial advice and trust. *Financial Services Review, 21*(3), 209–226.

Lapp, W. M. (2010). *Behavior models for prosperity: A statistical assessment of savings and behavioral change* (EARN Research Brief). Earned Assets Resource Network. https://www.earn.org/wp-content/uploads/2015/03/5_-_Behavioral_Models_for_Prosperity-_A_Statistical_Assessment_of_Savings_and_Behavioral_Change-1.pdf

Lind, T., Ahmed, A., Skagerlund, K., Strömbäck, C., Västfjäll, D., & Tinghög, G. (2020). Competence, confidence, and gender: The role of objective and subjective financial knowledge in household finance. *Journal of Family and Economic Issues, 41*(2), 626–638. https://doi.org/10.1007/s10834-020-09678-9

Lusardi, A. (2019). Financial literacy and the need for financial education: Evidence and implications. *Swiss Journal of Economics and Statistics, 155*(1), 1–8. https://doi.org/10.1186/s41937-019-0027-5

Madern, T. E. (2015). *Op weg naar een schuldenvrij leven. Gezond financieel gedrag noodzakelijk om financiële problemen te voorkomen [Towards a debt-free life. Healthy financial behavior necessary to prevent financial problems]* [Doctoral Dissertation, Leiden University]. Leiden University Scholarly Publications. https://openaccess.leidenuniv.nl/handle/1887/35411

Metcalf, B. R., & Zimbardo, P. (2016). Time perspective theory. In H. L. Miller (Ed.), *Encyclopedia of theory in psychology* (pp. 937–939). Sage.

Mian, A., Sufi, A., & Verner, E. (2017). Household debt and business cycles worldwide. *The Quarterly Journal of Economics, 132*(4), 1755–1817. https://doi.org/10.1093/qje/qjx017

Milkman, K. L. (2012). Unsure what the future will bring? You may overindulge: Uncertainty increases the appeal of wants over shoulds. *Organizational Behavior and Human Decision Processes, 119*(2), 163–176. https://doi.org/10.1016/j.obhdp.2012.07.003

Simonse, O., Van der Werf, M., & Wilmink, G. (2017). *Effective ways to advance responsible financial behaviour* (Report). Wijzer in geldzaken [Money Wise platform]. https://www.wijzeringeldzaken.nl/platform-wijzeringeldzaken/publicaties/Effective_ways_to_advance_responsible_financial_behaviour.pdf

Tracy, B. (2021). How to develop a positive money mindset. *Brian Tracy International*. https://www.briantracy.com/blog/financial-success/how-to-develop-a-positive-money-mindset/

Van Dijk, W. W., Van der Werf, M., & Van Dillen, L. F. (2021). *The Psychological Inventory of Financial Scarcity (PIFS): A psychometric evaluation*. Manuscript submitted for publication.

Vosgerau, J., Scopelliti, I., & Huh, Y. E. (2020). Exerting self-control ≠ Sacrificing pleasure. *Journal of Consumer Psychology, 30*(1), 181–200. https://doi.org/10.1002/jcpy.1142

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Het nemen van verantwoorde financiële beslissingen is van groot belang in onze moderne samenleving. Mensen krijgen met steeds meer uitdagingen te maken, zoals technologische vooruitgang in de financiële omgeving en complexe financiële producten en diensten. Hierdoor worden financiële beslissingen ook steeds moeilijker (Simonse, Van der Werf, & Wilmink, 2017) en hebben mensen meer moeite met het omgaan met geld, zelfs in goed ontwikkelde en rijke landen (Klapper, Lusardi, & Van Oudheusden, 2015). Onverantwoorde financiële beslissingen brengen aanzienlijke kosten met zich mee. Dit zijn zowel kosten voor het individu, zoals psychologische en fysieke gezondheidsproblemen, als kosten voor de samenleving, zoals lagere economische groei en meer werkloosheid (Mian, Sufi, & Verner, 2017; Van Dijk, Van der Werf, & Van Dillen, 2021). Verantwoorde financiële beslissingen kunnen echter mensen financiële ruimte geven om van het leven te genieten (Allen, 2020), en op die manier bijdragen aan hun financiële tevredenheid en hun financieel welzijn (CFPB, 2015). Het is daarom noodzakelijk voor beleidsmakers, onderwijzers, praktijkprofessionals en dienstverleners om de factoren te achterhalen die financiële beslissingen voorspellen, zodat er strategieën kunnen worden ontwikkeld, die de nadelige gevolgen van onverantwoorde financiële beslissingen beperken en tegelijkertijd de voordelen van verantwoorde financiële beslissingen benutten.

De empirische onderzoeken in dit proefschrift dragen hieraan bij door de relaties in kaart te brengen tussen enerzijds financiële kennis, psychologische factoren (i.c. houding ten opzichte van geld, toekomstgerichtheid en controlevaardigheden) en positief financieel gedrag en anderzijds financiële tevredenheid en financieel welzijn.

Belangrijkste bevindingen, implicaties en aanbevelingen

'Verantwoord Besteden' en 'Uitvoeren van Transacties' zijn twee modules die onderdeel waren van een grootschalig nationaal programma voor financiële educatie op Nederlandse basisscholen. In hoofdstuk 2 hebben we de effectiviteit van deze twee modules getoetst. Onze resultaten laten zien dat onderwijs de financiële kennis en vaardigheden van leerlingen kan vergroten, maar dat de effectiviteit per lesmodule kan verschillen. In ons onderzoek was de module 'Uitvoeren van Transacties' effectief, terwijl de module 'Verantwoord Besteden' dat niet was. Een van de redenen voor dit verschil kan zijn dat de leerlingen met betrekking tot de module 'Verantwoord Besteden' al over veel kennis van het onderwerp beschikten en deze lesmodule daardoor niet veel toevoegde aan de al aanwezige kennis. Mogelijk is deze module wel effectief voor jongere leerlingen, die minder kennis hebben over dit onderwerp.

De praktische implicaties van de resultaten van hoofdstuk 2 zijn tweeledig. Ten eerste laten ze zien dat financiële educatieprogramma's bepaalde financiële competenties van leerlingen kunnen verbeteren. Waarschijnlijk is het hierbij belangrijk dat de programma's leerlingen daarbij in staat stellen om wat ze hebben geleerd direct toe te passen door middel van voorbeelden uit het dagelijkse leven. Ten tweede is het belangrijk een duidelijk beeld te hebben van het beginniveau van kennis en vaardigheden van leerlingen. Hierbij is het van belang om niet alleen dit beginniveau te beoordelen bij de start van een programma, maar ook met ouders, verzorgers of voogden van de leerlingen te praten om een nog duidelijker beeld te krijgen van hun kennisniveau. Op deze manier kan de juiste inhoud voor het programma worden geselecteerd en tegelijkertijd de juiste periode worden bepaald waarin dit programma idealiter wordt gegeven.

In hoofdstuk 3 hebben we getoetst in hoeverre de combinatie van objectieve en subjectieve financiële kennis en positief financieel gedrag bijdragen aan financieel welzijn. Objectieve financiële kennis omvat het feitelijke begrip van het financiële landschap, terwijl subjectieve financiële kennis (hier ook wel financieel zelfvertrouwen genoemd) het eigen oordeel betreft over wat men van het onderwerp weet (Lind et al., 2020). Positief financieel gedrag, zoals rekeningen op tijd betalen en actief sparen, leidt tot verantwoorde financiële beslissingen. Onze bevindingen tonen aan dat uitsluitend de combinatie van hoge objectieve en hoge subjectieve financiële kennis gerelateerd is aan meer financieel welzijn vergeleken met de combinatie van lage objectieve en lage subjectieve financiële kennis.

Onze bevindingen laten ook zien dat bepaalde financiële gedragingen, namelijk rekeningen op tijd betalen, kosten van levensonderhoud dekken en actief sparen verband hebben met meer financieel welzijn. Andere financiële gedragingen, namelijk budgetteren en weloverwogen aankopen doen, hangen samen met minder financieel welzijn. Het streven naar het bereiken van lange termijn doelen en het bijhouden van uitgaven hadden geen verband met financieel welzijn. Het niet significante resultaat van het streven naar het bereiken van lange termijn doelen kan gerelateerd zijn aan de korte termijn maatstaf van financieel welzijn in ons onderzoek. Onderzoeken hebben eerder aangetoond dat het bijhouden van uitgaven een positief of negatief verband heeft met financieel welzijn (Finney, 2016; Xiao et al., 2006, 2009). Onze bevindingen hebben echter geen significant verband gevonden. Het is mogelijk dat in onze steekproef, het financieel voordeel van het bijhouden van uitgaven te beperkt was om invloed uit te oefenen op het brede construct van financieel welzijn. De negatieve relatie tussen een aantal positieve financiële gedragingen, namelijk budgetteren en weloverwogen aankopen doen, en financieel welzijn kan ten minste twee

mogelijke verklaringen hebben. Ten eerste, als dit gedrag uit noodzaak voortvloeit, kan het leiden tot stress en ongemak en daarmee ook minder financieel welzijn. Ten tweede kan het zijn dat de relatie in de tegenovergestelde richting loopt, wat betekent dat sommige mensen een laag financieel welzijn hebben en daarom de drang voelen om bovengenoemde gedragingen uit te voeren. Uit de bevindingen van hoofdstuk 3 kunnen financiële professionals en dienstverleners drie praktische implicaties halen voor het ontwikkelen van en communiceren over hun inspanningen op het gebied van financiële geletterdheid. Ten eerste moeten deze inspanningen gericht zijn op zowel objectieve als subjectieve financiële kennis met als doel dat mensen een hoog niveau van beide soorten kennis bereiken. Ten tweede moeten de inspanningen mensen helpen om specifieke financiële gedragingen te vertonen (d.w.z. actie te ondernemen), zoals het op tijd betalen van rekeningen, het dekken van kosten van levensonderhoud en actief sparen. Ten derde is het belangrijk om mensen te helpen inzien dat, ondanks dat sommige financiële gedragingen op korte termijn onaangenaam kunnen zijn, ze op lange termijn juist gunstig kunnen zijn.

In hoofdstuk 4 hebben we getoetst in hoeverre objectieve en subjectieve financiële kennis, toekomstgerichtheid en de houding ten opzichte van geld, alsook zelfbeheersing bij uitgaven en de ervaren gedragscontrole, positief financieel gedrag voorspellen en vervolgens een verband hebben met financiële tevredenheid. Toekomstgerichtheid heeft betrekking op een positieve houding ten opzichte van plannen en toegespitst zijn op de behoeften van de toekomst (Metcalf & Zimbardo, 2016). Een positieve houding ten opzichte van geld komt overeen met een positieve kijk van mensen op hun financiën, waarbij ze geld zien als een hulpmiddel om hun financiële doelen succesvol te bereiken (Tracy, 2021). Zelfbeheersing bij uitgaven betreft het vermogen van mensen om hun aankoopimpulsen te mitigeren (Haws, Bearden, & Nenkov, 2012). Ervaren gedragscontrole verwijst naar de mate van controle die mensen ervaren om bepaald gedrag te vertonen (Ajzen, 1985), in dit onderzoek gaat het dan om financieel gedrag. Onze resultaten wijzen uit dat alle opgenomen individuele factoren verband hebben met een of meer positieve financiële gedragingen, en vervolgens met financiële tevredenheid. Ervaren gedragscontrole, toekomstgerichtheid en financieel zelfvertrouwen blijken de sterkste indirecte voorspellers van financiële tevredenheid te zijn. Bovendien zijn financieel zelfvertrouwen en toekomstgerichtheid positief gerelateerd aan het aanpassen van uitgaven, terwijl ervaren gedragscontrole juist negatief gerelateerd is. Toekomstgerichtheid blijkt ook negatief gerelateerd te zijn aan het bijhouden van uitgaven. Het aanpassen van uitgaven en het bijhouden hiervan hebben op hun beurt negatief verband met financiële tevredenheid. Daarnaast geeft ons onderzoek aan dat alle individuele factoren,

met uitzondering van de houding ten opzichte van geld, direct gerelateerd zijn aan financiële tevredenheid. Dit betreft financieel zelfvertrouwen, financiële kennis, toekomstgerichtheid, zelfbeheersing bij uitgaven en ervaren gedragscontrole. Financieel zelfvertrouwen blijkt echter de sterkste directe voorspeller van financiële tevredenheid te zijn. Deze resultaten impliceren dat alle onderzochte individuele factoren de financiële tevredenheid kunnen verhogen, maar dat de sterkste bijdrage komt van financieel zelfvertrouwen, gevolgd door toekomstgerichtheid en ervaren gedragscontrole. De negatieve relatie tussen een aantal positieve financiële gedragingen, namelijk uitgaven aanpassen en bijhouden, en financiële tevredenheid heeft ten minste twee mogelijke verklaringen. Aan de ene kant zijn deze gedragingen niet prettig om uit te voeren, omdat ze tijd en energie kosten. Aan de andere kant moeten sommige mensen hun uitgaven aanpassen en hun financiën regelmatig controleren, bijvoorbeeld omdat ze met financiële problemen kampen (Madern, 2015). Uit de bevindingen van hoofdstuk 4 kunnen financiële professionals drie praktische implicaties halen. Ten eerste, om de financiële tevredenheid van mensen te vergroten, is het belangrijk dat de huidige praktijk aandacht blijft vestigen op financieel zelfvertrouwen. Ten tweede, om een verdere bijdrage te leveren aan financiële tevredenheid, wordt aanbevolen om in te gaan op de ervaren gedragscontrole en de toekomstgerichtheid van mensen. Ten derde is het van belang om mensen te helpen begrijpen dat sommige financiële gedragingen op korte termijn wellicht niet prettig zijn, maar op lange termijn juist gunstig kunnen zijn.

In hoofdstuk 5 hebben we getoetst in hoeverre executieve vaardigheden of functies en financiële zelfeffectiviteit positief financieel gedrag voorspellen en vervolgens verband houden met financieel welzijn. Executieve vaardigheden hebben betrekking op de mentale of cognitieve processen van mensen, zoals het plannen en organiseren, die nodig zijn om doelgericht gedrag te vertonen (Diamond, 2013). Financiële zelfeffectiviteit omvat de overtuiging van mensen om hun financiële taken te voltooien en hun financiële doelen te bereiken (Lapp, 2010). De resultaten van hoofdstuk 5 laten zien dat financiële zelfeffectiviteit positief gerelateerd is aan financieel welzijn via positief financieel gedrag, terwijl executieve functies dat niet zijn. In ons onderzoek is financieel welzijn gemeten als ‘huidige financiële stress’ en ‘toekomstige financiële zekerheid’. De interactie tussen financiële zelfeffectiviteit en executieve vaardigheden is in ons onderzoek geen voorspeller van financieel welzijn. Financiële zelfeffectiviteit blijkt echter wel een sterk direct verband te hebben met financieel welzijn, terwijl executieve vaardigheden een matig direct verband hebben. Deze bevindingen suggereren dat financiële zelfeffectiviteit belangrijker is om financieel welzijn te ervaren dan executieve functies. In onze ogen is het van belang om mensen te helpen zowel de meer

feitelijke vaardigheden als de meer subjectieve overtuiging in eigen vaardigheden te bevorderen. Uit voorgaand onderzoek is immers gebleken dat mensen met een sterke zekerheid maar zwakke feitelijke vaardigheden niet in staat zijn om hun gebrek aan voldoende competentie te herkennen. Dit fenomeen staat in de literatuur bekend als 'het Dunning-Kruger-effect' (Dunning, 2011). Ander onderzoek heeft ook aangetoond dat deze mensen meer kans hebben op het vertonen van onverantwoord bankgedrag, het overslaan van hypotheekbetaling en het aangaan van informele schulden (Balasubramnian & Sargent, 2020). Dergelijk gedrag zal op de lange termijn waarschijnlijk een nog grotere negatieve impact hebben op het financiële welzijn van deze mensen. Op basis van de bevindingen van hoofdstuk 5 hebben we een belangrijke aanbeveling voor praktijkprofessionals en dienstverleners. Bij het helpen van mensen met hun financiën is het belangrijk om voldoende aandacht te besteden aan zowel executieve functies als financiële zelfeffectiviteit.

Conclusie

De vier onderzoeken in dit proefschrift laten zien dat financiële beslissingen samenhangen met verschillende factoren, en deze beslissingen vervolgens samenhangen met zowel financiële tevredenheid als financieel welzijn. De resultaten impliceren dat financiële tevredenheid wordt bevorderd door subjectieve financiële kennis, toekomstgerichtheid en ervaren gedragscontrole. Verder, om financieel welzijn te vergroten, suggereren onze resultaten dat de combinatie van hoge objectieve en hoge subjectieve financiële kennis en financiële zelfeffectiviteit belangrijke factoren zijn. Naast deze factoren vinden we twee observaties vermeldenswaardig. Ten eerste zijn niet alle positieve financiële gedragingen onmiddellijk gunstig voor financiële tevredenheid of financieel welzijn. In hoofdstuk 3 hebben we bijvoorbeeld laten zien dat het budgetteren en het doen van weloverwogen aankopen onaangenaam kunnen zijn en daarom op korte termijn een negatieve invloed kunnen uitoefenen op financieel welzijn. Evenzo heeft hoofdstuk 4 laten zien dat het aanpassen en bijhouden van uitgaven onaangenaam kunnen zijn en daarom op korte termijn een negatieve invloed kunnen uitoefenen op financiële tevredenheid. Ten tweede, niet alle controlevaardigheden helpen mensen vanzelf om verantwoorde financiële beslissingen te nemen. Hoofdstuk 4 heeft bijvoorbeeld aangetoond dat mensen die meer zelfbeheersing hebben over hun uitgaven, minder aan hun financiële doelen werken. Het kan zijn dat mensen zo hun best doen om aankoopimpulsen te beperken, dat ze daardoor vergeten waarvoor ze het eigenlijk doen. Immers, dergelijke zelfbeheersing behoort mensen juist te helpen om financiële ruimte te creëren om gestelde doelen te bereiken, zoals op vakantie gaan of een

huis kopen. Bestaand onderzoek stelt dat zelfbeheersing ten koste kan gaan van plezier. Mensen kunnen bijvoorbeeld kiezen om 'deugdzame' producten te kopen in plaats van 'plezierige' producten. Denk aan gezonde, minder lekkere voeding eten in plaats van lekkere maar ongezonde voeding (Milkman, 2012). Recent onderzoek gaat echter tegen dit argument in, omdat het individu zichzelf kan trainen om in beide gevallen te genieten (Vosgerau, Scopelliti, & Huh, 2020).

De resterende vraag is of de bovengenoemde factoren en observaties financiële beslissingen daadwerkelijk beïnvloeden. Om deze vraag te beantwoorden, is het belangrijk dat onder andere beleidsmakers, onderwijzers, praktijkprofessionals en dienstverleners deze factoren en observaties in hun (bestaande en nieuwe) werkwijze meenemen en vervolgens de effectiviteit hiervan meten. In hoofdstuk 2 hebben we bijvoorbeeld getoetst of twee lesmodules van leerlingen in de vijfde klas effectief waren. Beleidsmakers, onderwijzers, praktijkprofessionals en dienstverleners kunnen deze aanpak als voorbeeld gebruiken wanneer zij interventies voor volwassenen ontwikkelen.

In het huidige proefschrift is ingegaan op cognitieve en psychologische factoren die een rol spelen bij financiële beslissingen. Afgezien van deze meer intrapersoonlijke factoren, worden financiële beslissingen ook beïnvloed door externe factoren, zoals cultuur, religie/geloof, toegang tot financieel advies, economische omgeving en sociaaleconomische status (Ciumara, 2014). Uit eerder onderzoek blijkt bijvoorbeeld dat mensen met toegang tot financieel advies betere financiële beslissingen kunnen nemen dan zij die dat niet hebben (Lachance & Tang, 2012). Hierdoor is het van belang om de eerder besproken factoren en observaties af te stemmen op de specifieke omstandigheden van mensen. Op deze manier zullen we in staat zijn om de effectiviteit van interventies te verhogen. Recente onderzoeken ondersteunen dit pleidooi en stellen dat programma's rekening moeten houden met de kenmerken en behoeften van verschillende doelgroepen (Dare, 2020; Lusardi, 2019). Met het onderzoek in dit proefschrift hopen we een bijdrage te leveren aan nieuwe strategieën om verantwoorde financiële beslissingen te bevorderen. Ook hopen we dat deze beslissingen vervolgens de financiële tevredenheid en het financiële welzijn van mensen vergroten. Dit traject behoort uiteindelijk mensen te helpen om een gelukkiger, gezonder en succesvoller leven te leiden.

References

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl & J. Beckman (Eds.), *Action-control: From cognition to behavior* (pp. 11–39). Springer.

Allen, T. A. (2020, January 25). The importance of learning to make sound financial decisions early in life. *Tyler Allen.* https://tylerallen.com/the-importance-of-learning-to-make-sound-financial-decisions-early-in-life/

Balasubramnian, B., & Sargent, C. S. (2020). Impact of inflated perceptions of financial literacy on financial decision making. *Journal of Economic Psychology, 80*, 102–306. https://doi.org/10.1016/j.joep.2020.102306

CFPB (Consumer Financial Protection Bureau). (2015). *Financial well-being: The goal of financial education* (Report). Consumer Financial Protection Bureau. https://files.consumerfinance.gov/f/201501_cfpb_report_financial-well-being.pdf

Ciumara, T. (2014, May). *Factors influencing individual financial decisions: A literature review* [Conference presentation]. Globalization, Intercultural Dialogue, and National Identity (GIDNI), Târgu Mureș, Romania. https://www.researchgate.net/publication/265601246_FACTORS_INFLUENCING_INDIVIDUAL_FINANCIAL_DECISIONS_A_LITERATURE_REVIEW

Dare, S. E. (2020, November 4). Financial education: A panacea in today's modern society? *Centrale Bank van Curaçao en Sint Maarten [Central Bank of Curaçao and Sint Maarten]*. https://cdn.centralbank.cw/media/blogs/20201104_blog_nov_2020_financial_education.pdf

Diamond, A. (2013). Executive Functions. *Annual Review of Psychology, 64*, 135–168. http://dx.doi.org/10.1146/annurev-psych-113011-143750

Dunning, D. (2011). The Dunning-Kruger effect: On being ignorant of one's own ignorance. *Advances in Experimental Social Psychology, 44*, 247–296. https://doi.org/10.1016/B978-0-12-385522-0.00005-6

Haws, K. L., Bearden, W. O., & Nenkov, G. Y. (2012). Consumer spending self-control effectiveness and outcome elaboration prompts. *Journal of the Academy of Marketing Science, 40*(5), 695–710. https://doi.org.10.1007/s11747-011-0249-2

Klapper, L., Lusardi, A., & Van Oudheusden, P. (2015). *Financial Literacy around the World*. Standard & Poor's Ratings Services Global Financial Literacy Survey.

Lachance, M. E. & Tang, N., (2012). Financial advice and trust. *Financial Services Review, 21*(3), 209–226.

Lapp, W. M. (2010). *Behavior models for prosperity: A statistical assessment of savings and behavioral change* (EARN Research Brief). Earned Assets Resource Network. https://www.earn.org/wp-content/uploads/2015/03/5_-_Behavioral_Models_for_Prosperity-_A_Statistical_Assessment_of_Savings_and_Behavioral_Change-1.pdf

Lind, T., Ahmed, A., Skagerlund, K., Strömbäck, C., Västfjäll, D., & Tinghög, G. (2020). Competence, confidence, and gender: The role of objective and subjective financial knowledge in household finance. *Journal of Family and Economic Issues, 41*(2), 626–638. https://doi.org/10.1007/s10834-020-09678-9

Lusardi, A. (2019). Financial literacy and the need for financial education: Evidence and implications. *Swiss Journal of Economics and Statistics, 155*(1), 1–8. https://doi.org/10.1186/s41937-019-0027-5

Madern, T. E. (2015). *Op weg naar een schuldenvrij leven. Gezond financieel gedrag noodzakelijk om financiële problemen te voorkomen [Towards a debt-free life. Healthy financial behavior necessary to prevent financial problems]* [Doctoral Dissertation, Leiden University]. Leiden University Scholarly Publications. https://openaccess.leidenuniv.nl/handle/1887/35411

Metcalf, B. R., & Zimbardo, P. (2016). Time perspective theory. In H. L. Miller (Ed.), *Encyclopedia of theory in psychology* (pp. 937–939). Sage.

Mian, A., Sufi, A., & Verner, E. (2017). Household debt and business cycles worldwide. *The Quarterly Journal of Economics, 132*(4), 1755–1817. https://doi.org/10.1093/qje/qjx017

Milkman, K. L. (2012). Unsure what the future will bring? You may overindulge: Uncertainty increases the appeal of wants over shoulds. *Organizational Behavior and Human Decision Processes, 119*(2), 163–176. https://doi.org/10.1016/j.obhdp.2012.07.003

Simonse, O., Van der Werf, M., & Wilmink, G. (2017). *Effective ways to advance responsible financial behaviour* (Report). Wijzer in geldzaken [Money Wise platform]. https://www.wijzeringeldzaken.nl/platform-wijzeringeldzaken/publicaties/Effective_ways_to_advance_responsible_financial_behaviour.pdf

Tracy, B. (2021). How to develop a positive money mindset. *Brian Tracy International*. https://www.briantracy.com/blog/financial-success/how-to-develop-a-positive-money-mindset/

Van Dijk, W. W., Van der Werf, M., & Van Dillen, L. F. (2021). *The Psychological Inventory of Financial Scarcity (PIFS): A psychometric evaluation*. Manuscript submitted for publication.

Vosgerau, J., Scopelliti, I., & Huh, Y. E. (2020). Exerting self-control ≠ Sacrificing pleasure. *Journal of Consumer Psychology, 30*(1), 181–200. https://doi.org/10.1002/jcpy.1142

Curriculum Vitae

Shekinah Eunice Dare was born on November 8, 1990 in Willemstad, Curaçao. In June 2008, as the best graduate of Maria Immaculata Lyceum (MIL), she obtained her VWO diploma in Economics & Society (including Management & Organization). In June 2012, she completed her master's degree in Economics and Business Economics (with specialization in Financial Economics) cum laude at Erasmus University Rotterdam. In June 2015, she also obtained her Pedagogical Certificate (PG) with highest honors. In January 2017, she started as an external PhD candidate at the departmental unit Social, Economic and Organisational Psychology at Leiden University, under the supervision of Professor Wilco van Dijk.

From August 2012 to October 2013, Shekinah worked as an advisor in the Corporate Finance department of KPMG Dutch Caribbean in Curaçao. Since October 2013, she has been working at the Central Bank of Curaçao and Sint Maarten. Over the past years, she has held several positions at the Bank; first as an economist and researcher in the Research department (currently the Economic Analysis & Research department), then as a supervisor and coordinator of financial education programs in the Conduct Supervision department (currently the Compliance, Governance, and Conduct Supervision department). She also led a working group of Curaçao's National Risk Assessment (NRA), where the module Financial Inclusion was examined. As of January 2021, she has been appointed as head of the Data & Statistics department. As an external researcher, she is furthermore affiliated with the Knowledge Centre Psychology and Economic Behaviour. On a voluntary basis, she tutors secondary school students with economics and mathematics, supervises bachelor and master students with their research projects, and provides guest lectures. In her spare time, she spends time with family and friends and enjoys writing, swimming, dancing, and singing.

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