Financial decisions matter: promoting positive financial behaviour, financial satisfaction, and financial well-being

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Chapter 3

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

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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.

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