Direct and indirect effects of self-control and future time perspective on financial well-being[☆]

W. Fred van Raaij [a,*], Leonore Riitsalu [b], Kaire Põder [c]

[a] *Tilburg University, School of Behavioral and Social Sciences, the Netherlands*
[b] *University of Tartu, Johan Skytte Institute of Political Studies, Estonia*
[c] *Estonian Business School, Tallinn, Estonia*

A B S T R A C T

Financial well-being is getting more attention in research and consumer policy, but there is limited understanding of its determinants. In this study, the effects of two psychological factors (self-control and future time perspective) are studied on two components of financial well-being (current money management stress and expected future financial security). Using structural equation modelling in data from 16 countries (n = 15,773), we find that self-control and future time perspective have both direct and indirect effects on the components of financial well-being. The indirect effects are mediated by past and present financial behaviour and have smaller effect sizes than the direct effects. Self-control is the main determinant of current money management stress, while future time perspective is the main determinant of expected future financial security. Our results emphasize that financial well-being should not be treated as a one-dimensional construct. Instead, the interventions for improving financial well-being should clearly target either its present or future component and consider psychological characteristics in their design.

1. Introduction

Financial well-being (FWB) of individuals and households is an important concept in research on financial literacy, competence (Oberrauch et al., 2023), capability, education, and behaviour. It is seen as the ultimate goal of initiatives aimed at improving financial skills (CFPB, 2015), but to date, there is insufficient evidence of financial education having an effect on FWB (Riitsalu et al., 2023). Instead, there are debates on the conceptualization and operationalization of FWB (García-Mata & Zerón-Félix, 2022). However, there is agreement on the importance of FWB as it affects mental and physical health, relationship quality, and subjective well-being (Brüggen et al., 2017; Netemeyer et al., 2018).

We interpret FWB as a subjective evaluation of the present financial situation and the expectation for the future. FWB depends on past and present financial behaviour and economic, psychological, contextual and institutional factors (Brüggen et al., 2017; Riitsalu & van Raaij, 2022). However, psychological determinants are often absent in studies on FWB, while it is argued that these factors may be more important than the socioeconomic determinants (Kempson & Poppe, 2018; Barrafrem, Västfjäll, & Tinghög, 2020). We contribute to that by analysing the direct and indirect effects of two psychological characteristics, self-control (SC) and future time

---

perspective (FTP), on the two components of FWB: current money management stress (CMMS) and expected future financial security (EFFS).

Financial behaviour has been shown to be a mediator between psychological and other individual determinants and FWB as an outcome (Brüggen, Hogreve, Holmlund, Kabadayi, & Löfgren, 2017; Iramani & Lutfi, 2021; Kempson & Poppe, 2018). Therefore, we expect that past and present financial behaviour as a mediator adds to the explanatory value of the effect of the psychological variables on financial well-being. Inspired by de Bruijn and Antonides (2020), we use four indicators of past and present financial behaviour (FB) in our study: making ends meet, paying bills on time, perceived debt, and having a financial buffer (i.e. savings).

We use data collected in 16 countries as part of the ING International Survey on Savings in October-December 2019. In the data analysis, we used structural equation modelling (SEM). This allowed us to test the relationships between variables that are not directly observable (latent variables) and variables that are observable (manifest variables). We used the manifest variables as indicators of the latent variables, and we also used regression analysis (path model) to estimate the relationships between the variables. Our approach allowed us to develop a conceptual framework for our study and use the survey responses as indicators for the latent variables in the model. We used modification indexes to improve the fit of the SEM model, which helped us test the validity of our theoretical model.

The structure of the paper is as follows: first, we discuss the theoretical and empirical insights for specifying constructs and describe the conceptual framework of our study. Second, we describe the measurement, including the design of the data collection instrument, sampling, and method. Third, the results of structural equation models are presented. Finally, we discuss the findings, conclusions, implications, and limitations of this study.

2. Financial well-being and psychological factors

2.1. Financial well-being and its components

Although FWB is seen as the ultimate goal of financial education (CFPB, 2015; OECD, 2015) and has a significant effect on sub-jective well-being (Netemeyer et al., 2018), no general agreement exists on how FWB should be defined and measured. Many literature reviews have been published summarizing the wide variety of approaches, definitions and measures (García-Mata & Zerón-Félix, 2022; Gonçalves et al., 2021; Kaur et al., 2021; Nanda & Banerjee, 2021) and highlighting the limitations of current understanding of the construct (Riitsalu et al., 2023). Therefore, we are summarizing only the main issues of FWB research here without repeating the detailed findings of these systematic reviews.

The first dispute in FWB literature is on whether to use an objective or subjective approach for conceptualizing FWB (García-Mata & Zerón-Félix, 2022; Riitsalu & van Raaij, 2022). In the objective approach, the focus is on objective financial indicators, such as the amount of savings or debt. The subjective approach implies a personal evaluation of the present financial situation and an anticipation for the future financial situation. It includes perceptions of whether one is able to live enjoyable life, in the present as well as in the future (Brüggen et al., 2017; CFPB, 2017). A third option is the combination of objective and subjective variables for explaining and predicting financial well-being.

Another path is to distinguish hedonic and eudaimonic approaches to well-being. Salignac et al. (2020, p. 1583) explain: "the hedonic perspective defines well-being as pleasure attainment and pain avoidance, indicating a focus on happiness. In contrast, the eudaimonic approach to well-being considers values such as meaning and self-realisation and focuses on people's ability to function. /.../ how happy people are with their current financial situation, and their ability to function economically.".

The second unsolved discussion in research is on how to define FWB. The definitions more commonly used are by Brüggen et al. (2017, p. 230): "Financial well-being is the perception of being able to sustain current and anticipated desired living standards and financial freedom." and by the US Consumer Financial Protection Bureau (CFPB, 2017, p. 6): "Financial well-being is a state of being wherein a person can fully meet current and ongoing financial obligations, can feel secure in their financial future, and is able to make choices that allow them to enjoy life." However, there is an abundance of alternative definitions and closely related constructs used simultaneously (García-Mata & Zerón-Félix, 2022; Riitsalu et al., 2023).

The third issue is, whether FWB can be treated as a one-dimensional measure or is it a multi-component construct (Riitsalu et al., 2023; Riitsalu & van Raaij, 2022). The supporters of the latter approach say FWB to contain a temporal dimension (past, present, and future financial situation), an emotional dimension (stress, anxiety, worry, enjoyment, security), and a functional dimension (being able to meet financial obligations). Netemeyer et al. (2018) focused on the temporal and emotional dimensions, which led to the development of two components of FWB: current money management stress (CMMS) and expected future financial security (EFFS). They found that the antecedents of CMMS are late payments, materialism, and lack of self-control. Antecedents of EFFS are perceived financial self-efficacy, positive financial behaviours, willingness to take investment risks, and planning for the long-term. Ponchio et al. (2019) analysed these components of FWB in data from Brazil and found objective financial knowledge to affect only CMMS. They found consumer spending self-control, materialism and time perspective to predict both components while personal saving orientation predicted only EFFS. Riitsalu & van Raaij (2022) analysed the effects of socio-economic status (age, gender, income, education), culture and institutional setting on CMMS and EFFS. They found that income is a predictor of both FWB components, while age differences are more pronounced than country differences. At the country level, institutional settings of countries, such as financial inclusion and trust in the government, are correlated with CMMS. Cultural characteristics of countries, such as individualism and indulgence, are correlated with EFFS.

De Bruijn and Antonides (2020) studied two constructs related to FWB that could be treated as the emotional dimensions: financial worry and rumination. Financial worry is repeated pessimistic thinking about one's current financial situation. Financial rumination is concerned with the causes (the past) and consequences (the future) of one's financial situation. They found that past and present

financial behaviours, such as making ends meet, perceived debt, and having a financial buffer, are mediators between income (changes) and worry/rumination as indicators of a low FWB.

Lind et al. (2020) distinguished two emotional dimensions of FWB: financial security and financial anxiety defined respectively as "a sense of security about one's financial situation" and "the negative emotions (i.e., anxiety, worry) caused by financial matters." These components are similar to EFFS and CMMS, respectively. Salignac et al. (2020) distinguished three emotional and functional dimensions ("themes") of FWB: (1) meeting expenses and having some money left over, (2) being in control, and (3) feeling financially secure. Their first theme is an extension of the financial behaviour'making ends meet.' Their second theme is related to self-control, while their third theme is similar to EFFS.

The fourth stream of research focuses on the determinants and outcomes of FWB. Brüggen et al. (2017) find in their conceptual analysis FWB to be influenced by contextual and personal factors, financial behaviours, and interventions to improve financial well-being. They include financial behaviour as a kind of a mediator in their conceptual framework. They mention three categories of consequences of FWB: (1) quality of life, happiness, general well-being, and relationship quality for the individual and the household, (2) reputation of and trust in organizations, and (3) welfare for society. FWB also affects the quality of work because people with a low FWB often worry and ruminate (de Bruijn & Antonides, 2020) about their finances and this may cause lower work performance. Individuals facing financial hardship are less likely to be successful in finding a job (Gerards & Welters, 2022), which is turning their situation into a vicious circle. Similar poverty traps can be caused by financial scarcity leading to financial avoidance or increased discounting (short-term focus), i.e., those lacking financial resources might delay or avoid dealing with their finances or become less patient in their saving decisions (Hilbert, Noordewier, & Van Dijk, 2022a, 2022b).

There are only a few studies that empirically study financial behaviour as the mediator between psychological characteristics and FWB. Dare et al. (2022) show in data from the United Kingdom that financial self-efficacy (the confidence in onés ability to manage personal finances) has a strong positive indirect effect on FWB, moderated by financial behaviours. Fan and Henager (2022) find in data from the US perceived financial capability (the confidence in onés financial knowledge and skills) to have direct and indirect effects on FWB, the latter are mediated by positive short- and long-term financial behaviours and financial satisfaction. These findings confirm the positive effects of confidence and prudent financial behaviour on FWB (Lind et al., 2020; Riitsalu & Murakas, 2019). However, there is a need for studies on psychological factors affecting FWB directly and indirectly through financial behaviours.

2.2. Self-control

Personality traits are enduring characteristics of the person, and are, in the perfect case, stable over time and situations, thus explaining and predicting the preferences and behaviours of persons. In a recent study, stability of self-control over a few years' period was evidenced: "Any change in people's self-control after reaching adulthood appears to be small, economically unimportant, and likely exogenous to their life experiences" (Cobb-Clark et al., 2023).

Personality traits are notorious for their low explanatory and predictive value, but there are positive exceptions. In the Big Five model (Norman, 1963; Costa & McCrae, 1992) and the HEXACO model (Ashton & Lee, 2007), conscientiousness stands out as a set of psychological characteristics predicting behaviour in several domains, such as education, work career, health, and finances. Self-control is a strong psychological characteristic and predictor in the conscientiousness set. High self-control is related to better adjustment, better relationships and interpersonal skills, more secure attachment, and optimal emotional responses (de Ridder et al., 2012; Tangney et al., 2004). Low self-control is a risk factor for a broad range of (inter)personal problems, such as addiction, lack of adaptation, debt, and criminality (Vazsonyi et al., 2017).

Self-control fits in a situation with the freedom to choose from many options. People with high self-control function less effectively in a restricted environment lacking the freedom to act as they perceive it to be effective for reaching their goals. Wilcox et al. (2011) found that people with high self-control reacted negatively to a very low spending limit on their credit card and did not restrict their spending to this low limit. People with high self-control want to set their own goals and, only if needed, impose their own restrictions.'Self-controlled people' need to be in personal control of their situation in order to make the right decisions, take effective measures and actions and persist in their endeavours of maintaining and improving their personal situation (Wilcox et al., 2011).

Two main conceptualizations of self-control are the "way of life" and dual-motive conflict. Self-control may be a way of life, setting personal goals and purposefully trying to reach these goals. Financial planning concerns setting goals and managing spending, saving, investing, and borrowing over the life course. Self-regulation is important for this conceptualization of self-control (Bandura, 1982). Self-regulation includes the necessary requirements such as having means and data for exerting self-control and having realistic and attainable life and financial goals and plans for reaching these goals.

The other conceptualization of self-control is solving a dual-motive conflict (Fujita, 2011). In this dilemma, two options are available, such as spending or saving money. In a dual-motive conflict, one should inhibit impulses and not select the easy option. Spending versus saving includes a temporal conflict of spending now or later or choosing between a small immediate reward and a larger delayed reward.

High self-control has favourable effects on several financial behaviours, such as saving to avoid debt (Nyhus, 2017; Strömbäck et al., 2017; van Raaij, 2016), controlling the level of spending, and deliberative decision-making before purchasing or borrowing. Sekścińska et al. (2021) found that self-control is correlated with lower financial risk-taking. Reflecting on self-control successes in the past, leads to a lower propensity to take financial risks, while reflecting on self-control failures in the past, leads to a higher propensity to take financial risks. Less financial risk taking and other prudent financial behaviours have favourable effects on FWB (Strömbäck et al., 2017). Low self-control coincides with the use of high-cost credit and over-indebtedness (Gathergood, 2012). However, self-control is not always desirable. The persistent pursuit of one goal, such as greed, avarice, or stinginess, may lead to other goals

remaining unfulfilled (Fishbach & Dhar, 2008; Kivetz & Keinan, 2006) and regret afterwards about this non-fulfilment.

2.3. Future time perspective

Time is one of the dimensions of structuring our experiences and expectations and updating our perception of the present and future world (Heidegger, 1927; Husserl et al., 1964; Nuttin, 1985). Kastenbaum (1961) defines FTP as a "general concern for future events" and explains it as a psychological characteristic or ability that depends on early life experiences and education. Kooij et al. (2018, p. 870) define FTP as a "general concern for and corresponding consideration of one's future." It is the ability to foresee, anticipate and plan for future desirable outcomes and is crucial for well-being. Kooij et al. (2018) conclude that FTP is not a stable personality trait but can be learned and may change over time depending on circumstances.

There are a few studies assessing the relationship of FTP with FWB or FB. Antonides, de Groot, & van Raaij (2011) studied mental budgeting in household financial management. They explain mental budgeting as a technique to assign budgets to expense categories to have a better financial overview and thus not overspend on expense categories. They found that FTP has a positive effect on financial overview, and thus on a better financial management.

Kempson, Finney, and Poppe (2017) included time orientation in their conceptual model of FWB. They found that self-control and time orientation influence spending and saving, however, they did not find a direct effect of these psychological factors on FWB. It is important to note that they used a combined measure of time orientation rather than focusing on FTP. Ponchio et al., (2019) found that FTP has a negative effect on CMMS (higher future orientation coincides with lower money stress) and a positive effect on EFFS (higher future orientation coincides with higher expected security).

Just like self-control, FTP may be a "way of life" and a dual-motive conflict. FTP has many beneficial consequences (van Raaij, 2016). People with a high FTP are non-impulsive in their choice between having things now or later, are better in delaying gratification, and in making monetary reservations (savings, investments, insurance) for the future.

3. Conceptual framework and hypotheses

Our study relies on the Netemeyer et al. (2018) conceptualization of FWB. In their original analysis, Netemeyer et al. (2018) distinguish only the direct effects of several factors on the two FWB components: CMMS and EFFS. However, psychological characteristics may exert part of their effects on FWB through financial behaviour. We thus expect also indirect effects of SC and FTP on FWB components through past and present financial behaviour (FB). Having a savings buffer or being in debt are largely the consequences of past financial behaviour such as active saving or borrowing in the past. We propose a theoretical model (Fig. 1) capturing the direct and indirect effects of two psychological characteristics (SC and FTP) through FB as a mediator, on two components (CMMS and EFFS) of FWB.

In this conceptual framework we assume that SC and FTP are independent variables exerting effects on FB as a mediator and on CMMS and EFFS as dependent variables. This is shown by the arrows in this direction in Fig. 1. The hypotheses are also stated in this causal direction. However, we should be aware that two-way and reverse causation may also be present. Two-way causality takes place
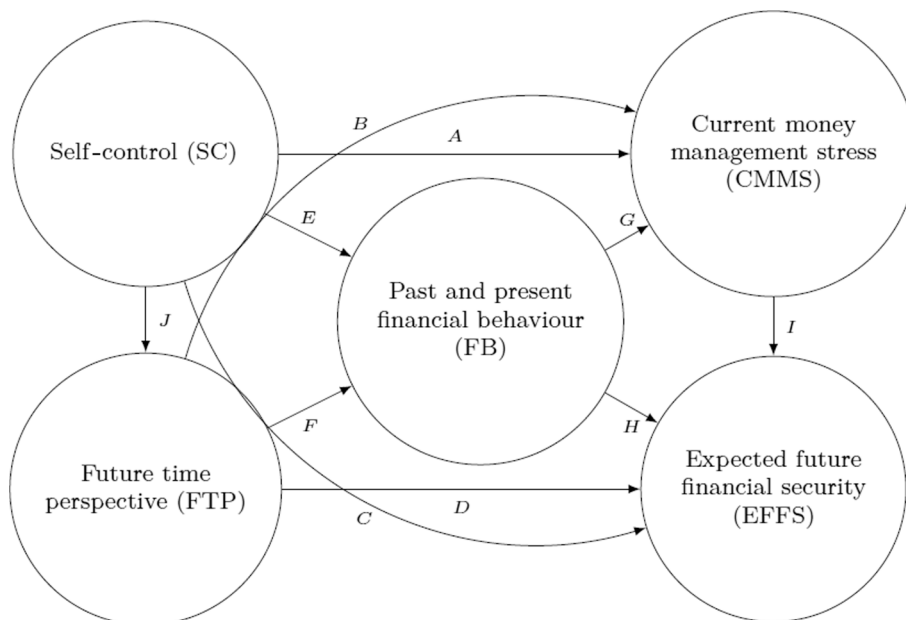

Fig. 1. Theoretical research model.

over long time periods, for example: higher self-control may lead to 'better' financial behaviour, and this may lead to higher satisfaction, self-esteem and self-control. Longer future time perspective may lead to more foresight, 'better' financial behaviour and a higher satisfaction, and this may lead to an even longer future time perspective. One could say that SC and FTP create and support learning potential and personal improvement.

Based on the literature discussed above and the theoretical research model of Fig. 1, five hypotheses are stated:

H₁ₐ: SC negatively affects CMMS (arrow A).
H₂ₐ: SC positively affects EFFS (arrow C).
H₃ₐ: FTP negatively affects CMMS (arrow B).
H₄ₐ: FTP positively affects EFFS (arrow D).
H₅: CMMS has a negative correlation with EFFS (arrow I).

With these five hypotheses, we test direct relationships without including FB as a mediating construct. In an alternative model with both direct and indirect effects through the mediation of FB, we test the following four hypotheses:

H₁ᵦ: SC negatively affects CMMS, both directly (arrow A) and indirectly (arrows E and G) with FB as a mediator.
H₂ᵦ: SC positively affects EFFS, both directly (arrow C) and indirectly (arrows E and H) with FB as a mediator.
H₃ᵦ: FTP negatively affects CMMS, both directly (arrow B) and indirectly (arrows F and G) with FB as a mediator.
H₄ᵦ: FTP positively affects EFFS, both directly (arrow D) and indirectly (arrows F and H) with FB as a mediator.

Note that the hypotheses require a test of the strength of the relationships in the model. The directions of these relationships are derived from the expectations based on the relevant theories.

4. Method and measurement

To test the theoretical research model, we use observed variables as indicators for five latent concepts (Fig. 1). For the analysis of the direct and indirect effects of two psychological constructs (SC and TFP) on the components of financial well-being (CMMS and EFFS), we use structural equation modelling (SEM).

4.1. Data and samples

The indicators for the latent constructs were measured as part of the ING Bank International Survey on Savings (IIS) in October-December 2019. Participants aged between 18 and 99 in this online survey came from: Australia (AUS, n = 1005), Austria (AUT, n = 1000), Belgium (BEL, n = 1017), Czechia (CZE, n = 1028), France (FRA, n = 1010), Germany (GER, n = 1005), Italy (ITA, n = 1004), Luxembourg (LUX, n = 504), The Netherlands (NLD, n = 1004), The Philippines (PHL, n = 1021), Poland (POL, n = 1020), Romania (ROM, n = 1008), Spain (ESP, n = 1009), Turkey (TUR, n = 1021), the United Kingdom (UK, n = 1083), and the United States of America (USA, n = 1034). The total number of survey participants in these sixteen countries was 15,773.

The data was collected before the outbreak of the Covid-19 pandemic by market research agency Ipsos and its affiliate agencies. In 13 countries, the sample is representative of the population based on age, gender, and region. The samples of Romania, the Philippines, and Turkey are representative of the online population. Ipsos added a quota on education level and working status for Turkey and on education level for Romania. In the Philippines, the sample is representative of the online population, gender, and age between 18 and 45 years. Therefore, data from these three countries must be interpreted as being representative of the online and not the total population. The questionnaire was translated into local languages by Ipsos under the supervision of experts from local ING bank branches.

The first two authors added some survey questions to the IIS questionnaire as indicators of self-control, future time perspective, and the financial well-being components CMMS and EFFS. These questions were considered as indicators for four latent constructs to be described in section 4.2. Past and present financial behaviour is also a latent construct indicated by four financial behaviours and is based on responses to questions used in the IIS survey. In a previous study using the same data set (Riitsalu & van Raaij, 2022), it was observed that in fourteen countries out of sixteen principal component analysis clearly separated the items for measuring CMMS and EFFS into two scales. However, in Austria and Germany, two components of EFFS were obtained. This is probably due to the translation of the questionnaire into German adding an additional meaning to EFFS (Riitsalu & van Raaij, 2022, Appendix B). It was concluded that due to measurement invariance problems, we should refrain from comparing the levels of CMMS and EFFS across countries.

4.2. Measurement of latent constructs

Our research model consists of five latent constructs. The validated scales are from the sources referenced below:

1. Self-control (SC) (Strömbäck et al., 2017; Tangney et al., 2004).
2. Future time perspective (FTP) (Lang & Carstensen, 2002).
3. Past and present financial behaviour (FB), consists of four behaviours (inspired by de Bruijn & Antonides, 2020):

   FB-1. 'Making ends meet' (present behaviour).
   FB-2. 'Paying bills on time' (present behaviour).
   FB-3. 'Perceived debt' (past behaviour).
   FB-4. 'Financial buffer' (past behaviour).

4. Current money management stress (CMMS) (Netemeyer et al., 2018).
5. Expected future financial security (EFFS) (Netemeyer et al., 2018).

Note that a high score on CMMS is a negative (undesirable) outcome: high stress. A high score on EFFS is a positive (desirable) outcome: high security. The response options for SC, FTP, CMMS, and EFFS are five statements with 5-point scales running from (1) "does not describe me at all" to (5) "describes me completely.".

The five response options for FB-1 are: What best describes you?

1. I always run out of money between pay periods.
2. I usually run out of money between pay periods.
3. I sometimes run out of money between pay periods.
4. I hardly ever run out of money between pay periods.
5. I never run out of money between pay periods.

The five response options for FB-2 are: What best describes you?

1 In the previous 12 months, I did not pay any bill late.
2 In the previous 12 months, I paid a bill late once or twice.
3 In the previous 12 months, I paid some of my bills late.
4 In the previous 12 months, I paid many of my bills late.
5 In the previous 12 months, I almost always paid my bills late.

The five response options for FB-3 are: What best describes you?

I would need much less debt to feel I was in a comfortable financial position.
I would need a little less debt to feel I was in a comfortable financial position.
I am in a comfortable financial position with my current level of debt.
I could have a little more debt and still be in a comfortable financial position.
I could have much more debt and still be in a comfortable financial position.

The six response options for FB-4 are: How many months of net (take-home) income do you have in savings?

1. No savings.
2. Less than the equivalent of one month of my household's net (take home) income.
3. Equivalent of 1–3 times my household's net (take home) monthly income.
4. Equivalent of 4–6 times my household's net (take home) monthly income.
5. Equivalent of 7–12 times my household's net (take home) monthly income.
6. >12 times my household's net (take home) monthly income.

4.3. Method

The estimation strategy is based on structural equation modelling (SEM). We test the relationships between unobserved (latent) constructs, measured by observable (manifest) variables as indicators of the latent construct (path analysis), and simultaneously allow estimating a structural model (regressions), including mediation. This has been done according to the theoretical model (Fig. 1). Additionally, we use modification indexes in R-package Lavaan (Rosseel, 2012) to improve the fit of the final model. Thus, we simultaneously test our theoretical model.

The debate about whether SEM of cross-sectional data may indicate causal relationships is contested by scholars already for a decade or more (Bollen & Pearl, 2013). One of the main drivers of this debate is the issue of whether SEMs and regressions are essentially equivalent, and if so, whether in most cases causal arguments are difficult to test because of reverse and spurious causality and other biases inherent in cross-sectional regression estimates. To be clear, it is argued not to be the case here, because SEM explicitly recognizes that the latent variables are measured with error and by multiple indicators (questionnaire items). So, firstly SEM is assuming that in the measurement model, the mean of disturbances is zero and the researcher decides which elements to fix. Secondly, SEM is taking measurement error into account. Thirdly, researchers may include correlated disturbances. Of course, techniques alone do not guarantee that, instead of correlational, causal conclusions can be drawn. Most of all, the obtained (well-fitting) empirical model should be supported by theory to draw causal conclusions.

5. Results

5.1. Descriptive statistics

We start by defining the FWB components CMMS and EFFS as the dependent latent constructs and SC and FTP as the independent

latent constructs in all sixteen countries.

Table 1 gives the means and standard deviations of the observable (manifest) variables, showing the UK sample (n = 1,083) and the total sample of 16 countries (n = 15,773). The means and standard deviations of these results show that there are only small differences between the UK sample and the total sample. In the same way, we find only small differences between the other countries. That allows us using the UK as a case country and test whether conclusions for the UK are also valid for the other 15 countries in the study.

The distribution of the observable items of CMMS is right-skewed. The distribution of the observable items of EFFS is less skewed. However, in both cases, observable items of CMMS and EFFS are positively intercorrelated, with somewhat higher intercorrelations between EFFS items than between CMMS items. Cronbach's alpha of the five CMMS indicators is 0.87. Cronbach's alpha of the five EFFS indicators is 0.90. The scales run from (1) "does not describe me at all" to (5) "describes me completely".

Cronbach's alpha is not a test of one-dimensionality and has the underlying assumption of tau-equivalence, i.e., the same true score for all test items, or equal factor loadings of all items in a factorial model. This is a requirement for Cronbach's alpha to be equivalent to the reliability coefficient (Cronbach, 1951). If the assumption of tau-equivalence is violated, the true reliability value will be underestimated (Raykov, 1997; Graham, 2006). Moreover, aggregate measures as the sum of the items do not account for measurement errors. But the structural equation model (SEM) accounts not only for measurement errors, but also for violations of tau-equivalence, and takes reliability analysis as descriptive metrics.

Table 1 shows a low variance and higher mean scores of the items of the psychological characteristics SC and FTP, compared with the dependent constructs items CMMS and EFFS. Reverse scales are reported for many items to obtain positive correlations between items. Cronbach's alpha of the SC indicators is 0.74. In the case of self-control, item SC-3 is not correlated with the other four items. Cronbach's alpha of the FTP indicators is 0.52. Item FTP-2 is not correlated with the other two items, FTP-1 and FTP-3. Cronbach's alpha also reveals that in the case of FTP just summing up the three items is not a reliable procedure. The measurement scales run from (1) "does not describe me at all" to (5) "describes me completely".

The mediator construct FB consists of four financial behaviours; two behaviours related to the present: FB-1 "making ends meet", and FB-2 "paying bills on time", and two behaviours related to the past: FB-3 "perceived debt", and FB-4 "financial buffer (savings)." Due to non-response, FB-4 (Table 1) has fewer observations: n = 930 in the UK sample and n = 13,099 in the total sample. Paying bills on time (FB-2) has the highest mean score, indicating that most people reported being seldom late with paying their bills. This item has low correlations with the other items, that have different distributional properties. The Cronbach's alpha of the FB items is 0.72. The total sample size is n = 12,572, because some participants did not answer these questions.

A large proportion (31%) of the participants indicate having no savings (category 0 in FB-4 financial buffer) and 69% of those, who state that they always run out of money between pay periods (difficulties with making ends meet), do not have a financial buffer

Table 1
Means and standard deviations of survey items.

Survey questions/items (indicators)	United Kingdom		Total sample	
	mean	standard deviation	mean	standard deviation
Self-control (SC)				
SC-1: I have a hard time breaking bad habits (R).	3.30	1.13	3.35	1.10
SC-2: I get distracted easily (R).	3.43	1.09	3.50	1.08
SC-3: I am good at resisting temptation.	3.51	1.06	3.22	1.08
SC-4: I do things that feel good in the moment but regret later on (R)	3.67	1.07	3.53	1.05
SC-5: I often act without thinking through all the alternatives (R).	2.86	0.97	3.67	1.06
Future time perspective (FTP)				
FTP-1: I generally plan for the future.	3.17	1.02	3.35	1.04
FTP-2: I take each day as it comes (R).	3.14	0.97	2.91	1.09
FTP-3: I like planning and preparing for the future.	3.12	1.04	3.37	1.05
Past and present financial behaviour (FB)				
FB-1: Making ends meet (present).	3.29	1.40	3.27	1.32
FB-2: Paying bills on time (present).	4.34	1.08	4.37	1.01
FB-3: Perceived debt (past).	2.63	1.22	2.54	1.16
FB-4: Financial buffer/savings (past).	2.19	1.99	2.13	1.83
Current money management stress (CMMS)				
CMMS-1: Because of my money situation, I feel I will never have the things I want in life.	2.66	1.26	2.62	1.23
CMMS-2: I am behind with my finances.	2.19	1.22	2.20	1.20
CMMS-3: My finances control my life.	2.67	1.19	2.64	1.18
CMMS-4: Whenever I feel in control of my finances, something happens that sets me back.	2.65	1.18	2.60	1.20
CMMS-5: I am unable to enjoy life, because I obsess too much about money.	2.33	1.20	2.25	1.16
Expected future financial security (EFFS)				
EFFS-1: I am becoming financially secure.	2.81	1.14	2.76	1.14
EFFS-2: I am securing my financial future.	2.88	1.12	2.96	1.16
EFFS-3: I will achieve the financial goals I have set for myself.	2.87	1.16	3.04	1.13
EFFS-4: I saved (or will be able to save) enough money to last me to the end of my life.	2.58	1.25	2.50	1.24
EFFS-5: I will be financially secure until the end of my life.	2.70	1.22	2.66	1.21

Notes: All variables use 5-point scales (1–5), except for behaviour FB-4 (6-point scale: 0–5). Sample of United Kingdom (n = 1,083) and total sample (n = 15,773), except for behaviour FB-4: United Kingdom (n = 930) and total sample (n = 13,099). (R) means reverse coding to obtain positive correlations between items.

(savings) either.

In Table 2, we summarize the reliability coefficients of the latent variables: Cronbach's alpha, AVE (average variance extracted) and CR (composite reliability). AVE is the sum of the squared factor loadings divided by the number of items. The usual threshold for AVE is 0.50. The latent variables meet the threshold for AVE. AVE is often criticized because it does not give much information. Four of the CR scores are higher than the corresponding AVE scores (Table 2). CR is a more trusted indicator of reliability than AVE. The CR reliability coefficient for FB does not meet the usual threshold of 0.70. This may be a violation of the one-dimensionality of FB. Although the observable items are positively correlated, FB is probably not a one-dimensional construct. The skewed distribution of FB-2 is likely to be the cause of this relatively low reliability of FB, as assessed by CR.

5.2. Structural equation model

Four different SEM models have been run in the UK data. We started estimating the restricted theoretical model (M_0) estimating only direct effects between psychological characteristics (independent variables) and the components of financial well-being (dependent variables). This model is a reference point for models M_1 and M_2 with direct and indirect effects, which is consistent with our theoretical model. Model M_1, including the indirect effects, has a better fit with the data than model M_0. In model M_1, we indicate that latent constructs can be estimated by the observed variables indicated in Table 1. In model M_2, we added the relationships between the independent variables SC and FTP, and between the dependent variables CMMS and EFFS. Finally, we specify a revised model M_3, using modification indices. Modification indices help to respond to "what if?" questions on whether freeing parameter constraints or adding paths will improve the model. The revised model M_3 has a considerably better fit than model M_2. Model M_3 meets the criteria of CFI and RMSEA, and we consider model M_3 as the final model (Table 3) for the data. Note that model M_3 does not include a relationship between SC and FTP (arrow J).

The fit statistics in Table 3 show that the revised model M_3 with CFI = 0.973 and RMSEA = 0.048 has a good fit. In all models, we have the same number of observations (n = 930), thus the model fit characteristics are comparable. In models M_0, M_1 and M_2, the Comparative Fit Index (CFI), which compares the fit of a target model to the fit of the null model, is below the target cut-off value. Only in model M_3, CFI is above the cut-off value of 0.95. For the Root Mean Square Error of Approximation (RMSEA), where values close to 0 represent a good fit, only model M_3 meets the threshold of being lower than 0.05.

The Chi-Square statistic may not discriminate between good and poor fitting models (Kenny & McCoach, 2003). Due to the restrictiveness of the Chi-Square statistic, we rely on the fit indexes CFI and RMSEA. The index RMSEA is now regarded as one of the most informative fit indices (Hooper et al., 2008) because it favours parsimony by choosing the model with the lower number of parameters. Recommendations for RMSEA cut-off points have been reduced considerably in the past fifteen years. However, most of the authors state a cut-off value close to 0.06 (Hu & Bentler, 1999) or a stringent upper limit of 0.07 (Steiger, 2007) as a consensus amongst experts in this area (Hooper et al., 2008). The confidence interval around the RMSEA value indicates that in a well-fitting model the lower limit is close to 0, while the upper limit should be lower than 0.05. Model M_3 of the UK data meets these fit criteria.

Model M_3 not only fits the data of the UK but the data of 11 of the other 15 countries as well (Table 3). Therefore, it is valid to use UK as an example country and draw conclusions from the results. The RMSEA fit index of the other countries varies between 0.039 (Australia) and 0.067 (Luxembourg). The models for Austria, France, Germany and Luxembourg do not meet the criterion of RMSEA < 0.05, nor does the CFI of these four countries meet the criterion of CFI > 0.95. Note that Luxembourg has a smaller sample size (n = 504) than the other countries, which may explain why Luxembourg does not meet the fit criteria. In Austria and Germany, the second factor of EFFS emerged due to the translation of the EFFS statements from English into German (Riitsalu & van Raaij, 2022, Appendix B). This may explain why the models of these three countries do not meet the criteria for RMSEA and CFI.

Fig. 2 shows the fitted model with the UK data. Note that the direct effect of SC on EFFS (arrow C) is not significant and thus not shown in Fig. 2. Also, the relationship between SC and FTP (arrow J) is not significant either and thus not shown in Fig. 2. Table 4 indicates the structural path coefficients of the SEM analyses and the direct and indirect effects of all 16 countries.

5.3. Direct and indirect effects

The final model (M_3) meets the theoretical expectations to a large extent. We describe the effects based on Figs. 1 and 2 and Table 4. The total effect to which the independent (predictor) variable affects the dependent (outcome) variable is the sum of the direct effect and indirect effects through a mediator. In a simple example, if the independent variable SC is presumed to affect the outcome variable CMMS, the direct effect of SC on CMMS is (arrow) A. The indirect effect of CS on CMMS through the mediator FB is (arrow) E multiplied by (arrow) G. The total effect of SC on CMMS is A + EG. The arrows are shown in Fig. 1.

SC directly affects CMMS (arrow A in Fig. 1; row A in Table 4), as well as indirectly through mediator FB (arrows E and G in Fig. 1; row E-G in Table 4). SC does not directly affect EFFS and this effect has thus not been included in Fig. 2. The indirect effects of SC

Table 2
Reliability coefficients of latent variables.

	SC	FTP	FB	CMMS	EFFS
Cronbach's alpha	0.74	0.52	0.72	0.87	0.90
AVE, average variance extracted	0.74	0.84	0.51	0.97	0.74
CR, composite reliability	0.89	0.89	0.57	0.89	0.90

Table 3
Fit characteristics of SEM model specifications.

Model	Chi^2(df,p)	CFI	RMSEA (CI_{95})	ΔChi^2(df)
M$_0$: direct effects (A, B, C, D)	1540.61	0.898	0.084	
	(205, 0.000)		(0.082–0.086)	
M$_1$: indirect and direct effects	1294.37	0.917	0.076	246.24***(2)
(M$_0$ + E, F, G, H)	(201, 0.000)		(0.074–0.079)	
M$_2$: correlations between SC ↔ FTP (J) and between CMMS ↔ EFFS (I) (M$_1$ + I, J)	1170.02	0.926	0.072	124.35***(2)
	(199, 0.000)		(0.046–0.075)	
M$_3$: revised model	493.06	0.973	0.048	676.96***(44)
(A, B, D, E, F, G, H, I)	(155, 0.000)		(0.046–0.051)	

Notes: df = degrees of freedom, p indicates the significance of Chi-square test, CI$_{95}$ stands for confidence interval indicating range estimates of RMSEA with 95% significance. Thresholds for tests are CFI > 0.95 and RMSEA < 0.05.
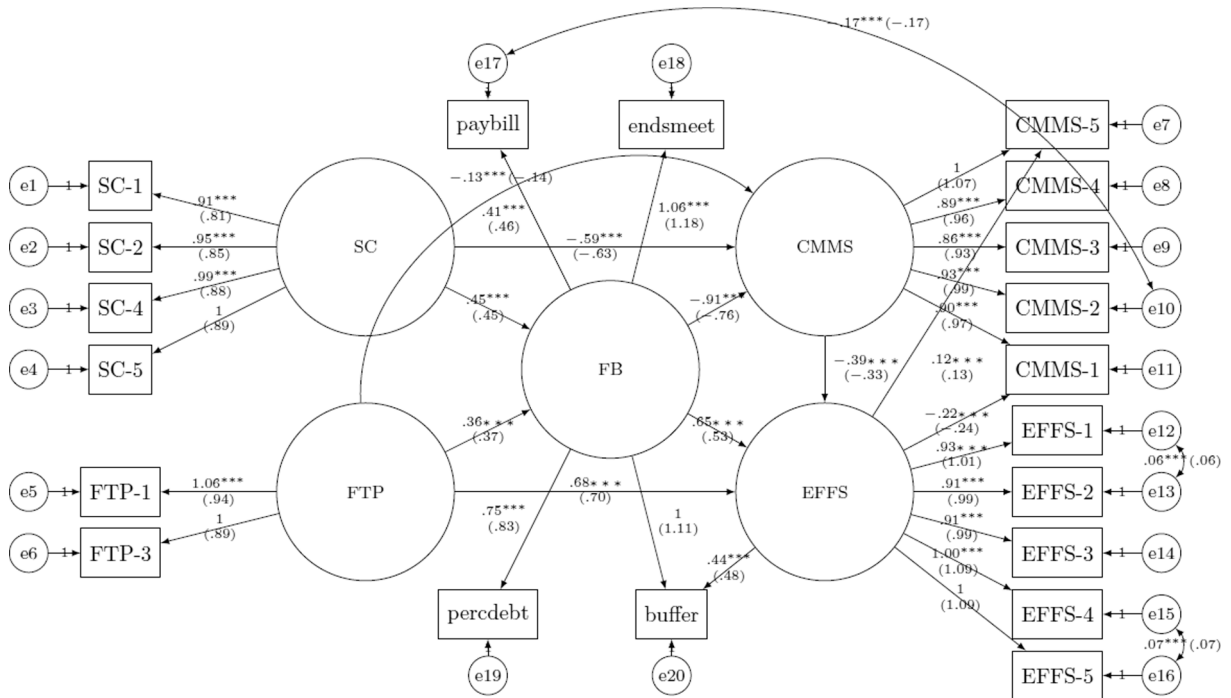

Fig. 2. Structural equation model: direct and indirect effects of psychological characteristics on financial well-being components, mediated by past and present financial behaviour. *Notes*: data from the United Kingdom, n = 930, standardised effects between brackets. Intercepts and error term variance are not shown to increase readability. All intercepts and error term variances are significant at *** p < 0.001. SC = self-control, FTP = future time perspective, FB = past and present financial behaviour, CMMS = current money management stress, EFFS = expected future financial security. Goodness-of-fit measures: RMSEA = 0.049 (CI$_{95}$ interval 0.046–0.051); CFI = 0.97.

through FB to EFFS are shown by arrows E and H in Fig. 1 and row E-H in Table 4. This means that SC affects CMMS: higher self-control corresponds with lower money management stress. The direct effect of SC on CMMS is larger than the indirect effect through FB (Table 4). SC does not directly affect EFFS. We conclude that self-control (SC) is determining current money management stress (CMMS) and not expected future financial security (EFFS).

FTP directly affects CMMS (arrow B in Fig. 1; row B in Table 4), as well as indirectly through FB (arrows F and G in Fig. 1; row F-G in Table 4). The effects are significant, although relatively small. FTP directly affects EFFS (arrow D in Fig. 1; row D in Table 4), as well as indirectly through FB (arrows F and H in Fig. 1; row F-H in Table 4). The direct effect of FTP on EFFS is larger than the indirect effect through FB (Table 4). The effect of FTP on CMMS may be understood as avoiding or solving current money problems with an eye on an expected financially secure future. We conclude that future time perspective (FTP) is mainly affecting expected future financial security (EFFS) and, to a lower degree, affecting current money management stress (CMMS).

The coefficients of the direct effects of SC and FTP on CMMS and EFFS are significant and relatively large, and the effect sizes are as expected. Therefore, we obtain evidence not to reject hypotheses H$_{1a}$, H$_{3a}$ and H$_{4a}$, and to reject hypothesis H$_{2a}$. For practical applications, the effect sizes of model M$_3$ may be compared to partial R^2. If the numbers are below 0.13, effect size is small. If the numbers are between 0.13 and 0.26, effect size is medium. If the numbers are > 0.26, effect size is large.

For all 16 countries, the direct effect of SC on CMMS (row A in Table 4) is larger than the indirect effect through FB (row E-G in

Table 4
Structural path coefficients; direct, indirect and total effects; sample sizes, and SEM fit characteristics of data from 16 countries.

Countries	AUS	AUT	BEL	CZE	FRA	GER	ITA	LUX	NLD	PHL	POL	ROU	ESP	TUR	USA	UK
Direct effects:																
A: SC → CMMS	−0.60***	−0.40***	−0.48***	−0.48***	−0.51***	−0.63**	−0.58***	−0.23**	−0.44***	−0.68***	−0.46***	−0.49***	−0.56***	−0.57***	−0.70***	−0.63***
B: FTP → CMMS	−0.11**	−0.09	−0.12**	−0.06	−0.15**	−0.02	−0.06	−0.23**	0.05	0.22**	−0.12**	0.04	0.06	−0.14**	−0.05	−0.14**
D: FTP → EFFS	0.68***	0.53***	0.56***	0.50***	0.58***	0.54**	0.53***	0.45***	0.52***	0.70***	0.45***	0.40***	0.52***	0.58***	0.71***	0.70***
Mediation by FB																
E: SC → FB	0.43***	0.23**	0.24**	0.37***	0.36**	0.38**	0.29**	0.19**	0.30**	0.39***	0.19**	0.29**	0.28**	0.45***	0.53***	0.45***
F: FTP → FB	0.39***	0.25**	0.38***	0.25**	0.41**	0.34**	0.44***	0.40***	0.30***	0.39***	0.40***	0.26**	0.31**	0.32**	0.39**	0.37**
G: FB → CMMS	−0.71***	−0.73***	−0.78***	−0.75***	−0.80**	−0.71***	−0.66***	−0.84***	−0.72***	−0.34**	−0.62***	−0.62***	−0.58***	−0.68***	−0.77***	−0.76***
H: FB → EFFS	0.57***	0.61***	0.70***	0.55**	0.68**	0.62***	0.70***	0.73***	0.65***	0.61***	0.70***	0.59***	0.52***	0.56***	0.58***	0.53***
Association																
I: CMMS → EFFS	−0.36**	−0.46***	−0.50***	−0.40***	−0.44***	−0.28**	−0.37**	−0.58***	−0.35**	−0.15	−0.41***	−0.29**	−0.24**	−0.43***	−0.27**	−0.33**
Indirect effects:																
E-G: SC → CMMS	−0.31	−0.17	−0.19	−0.28	−0.29	−0.27	−0.19	−0.16	−0.22	−0.13	−0.12	−0.18	−0.16	−0.31	−0.41	−0.34
E-H: SC → EFFS	0.25	0.14	0.17	0.20	0.24	0.24	0.20	0.14	0.20	0.23	0.13	0.17	0.15	0.25	0.31	0.24
F-G: FTP → CMMS	−0.28	−0.18	−0.30	−0.19	−0.33	−0.24	−0.29	−0.34	−0.22	−0.13	−0.25	−0.16	−0.18	−0.22	−0.30	−0.28
F-H: FTP → EFFS	0.22	0.15	0.27	0.14	0.28	0.21	0.31	0.29	0.20	0.24	0.28	0.15	0.16	0.18	0.23	0.20
Total effects:																
SC → CMMS	−0.91	−0.57	−0.67	−0.76	−0.80	−0.90	−0.77	−0.39	−0.66	−0.81	−0.58	−0.67	−0.72	−0.88	−1.11	−0.97
SC → EFFS	0.25	0.14	0.17	0.20	0.24	0.24	0.20	0.14	0.20	0.23	0.13	0.17	0.15	0.25	0.31	0.24
FTP → CMMS	−0.39	−0.27	−0.42	−0.25	−0.48	−0.26	−0.35	−0.57	−0.17	−0.09	−0.37	−0.12	−0.13	−0.36	−0.35	−0.42
FTP → EFFS	0.90	0.68	0.83	0.64	0.86	0.75	0.84	0.74	0.72	0.94	0.73	0.55	0.68	0.76	0.94	0.90
n	835	792	754	860	873	831	808	381	762	781	911	888	886	906	901	930
RMSEA	0.039	0.064	0.055	0.049	0.064	0.064	0.051	0.067	0.046	0.043	0.044	0.041	0.045	0.044	0.055	0.049
CFI	0.983	0.936	0.953	0.957	0.937	0.932	0.964	0.926	0.970	0.968	0.970	0.967	0.967	0.969	0.967	0.973

Notes: * p < 0.05; ** p < 0.01; *** p < 0.001. Thresholds for the goodness-of-fit indicators: RMSEA < 0.05; CFI > 0.95.

Table 4). In the same way, for all countries, the direct effect of FTP on EFFS (row D in Table 4) is larger than the indirect effect through FB (row F-H in Table 4). FTP not only has a direct effect on EFFS, but also on CMMS. However, for all sixteen countries, the direct effect of FTP on CMMS (row B in Table 4) is smaller than the indirect effect through FB (row F-G in Table 4). Thus, we cannot reject hypotheses H_{1b}, H_{3b} and H_{4b}, but reject hypothesis H_{2b}.

There is no significant correlation between SC and FTP. This relationship has been excluded in the revised model M_3 (Table 3). We cannot reject H_5 as we observe that CMMS has a significant negative effect on EFFS for fifteen of the sixteen countries (except for the Philippines). Current money problems may cause people to expect lower financial security in the future. CMMS and EFFS are thus no independent constructs.

The average total effect of SC on CMMS across countries is −0.76, while the average total effect of SC on EFFS across countries is 0.20. The average total effect of FTP on CMMS across countries is −0.31, while the average total effect of FTP on EFFS across countries is 0.78 (Table 4). This indicates that SC is a strong predictor of CMMS, and FTP is a strong predictor of EFFS. The average total effect of SC on EFFS is insignificant and excluded from the final model M_3. The average total effect of FTP on CMMS is significant for 8 of the 16 countries, although it is relatively small.

Looking to the models of each of the 16 countries (Table 4), we observe that 12 countries have fit characteristics meeting the criteria described in the previous section. The models of 4 countries do not meet the criteria of RMSEA and CFI: Austria, France, Germany, and Luxembourg, as explained earlier.

The structural path coefficients of countries vary. Some countries show extreme values (e.g., Luxembourg, Philippines, USA), while without these outliers the coefficients of the direct effects of FB on CMMS vary between −0.59 and −0.77, and of FB on EFFS vary between 0.53 and 0.71 and are thus relatively similar. The results of model M_3 in 11 countries are consistent and this supports the external validity of SEM model M_3.

5.4. Are the obtained relationships and effects confounded by income?

One possible issue of concern is that the results may be confounded by the income level of participants. People with a high relative to a low income may experience lower money management stress and expect higher financial security. The relationships between the psychological variables and the components of financial well-being may be spurious because the level of income may be the real cause of these relationships. To control for that, we run the SEM analysis of the UK data for three subgroups: low-, medium- and high-income participants. The structures and coefficient values of these three SEM analyses have no significant differences. The relationships between the variables are thus similar for the low-income, medium-income and high-income participants, providing evidence that income is not affecting the structural relationships identified and presented in Fig. 2.

We also calculated a model including income as an additional mediator, testing whether there is a structural relationship between SC, FTP, and income. It rests on the premise that psychological characteristics are relatively stable and affect income. As the best fitting model indicates (structural paths are shown in Fig. 3), we find a weak structural path from income to FB, signalling that there is a
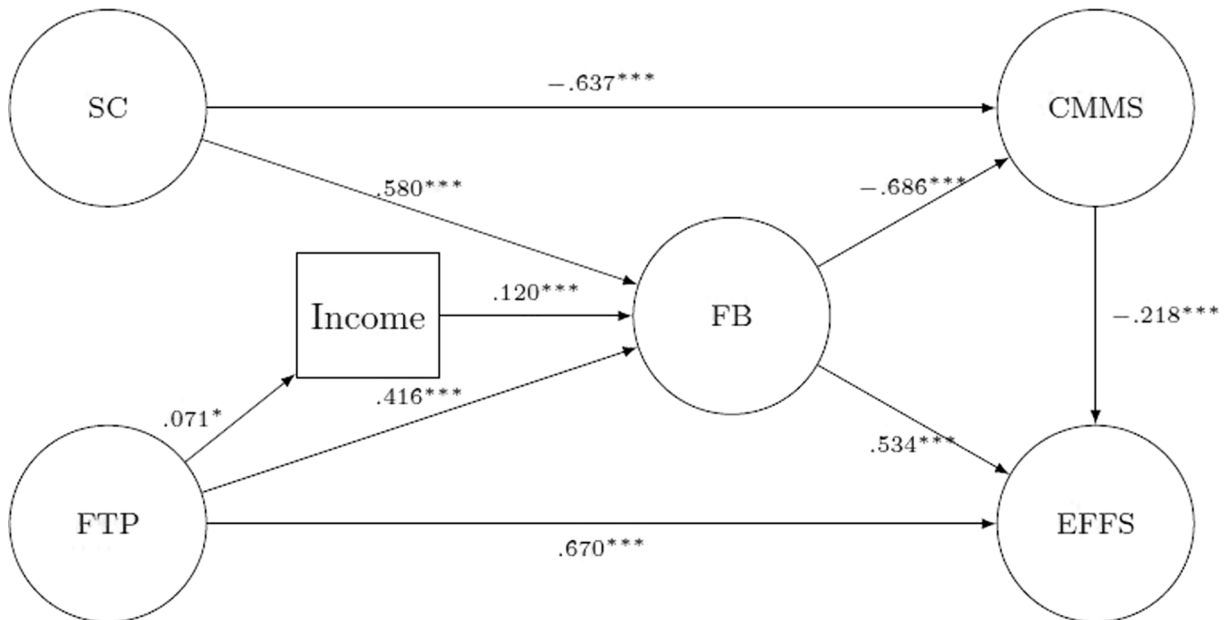

Fig. 3. SEM model fit with income as a mediator between FTP and FB. *Notes:* * p < 0.05; ** p < 0.01; *** p < 0.001; n = 891, UK data, goodness of fit measures: RMSEA = 0.062, CFI = 0.951. Income measured on 10-point scale. Only structural path analysis shown for the best fitting model. The factor structure is the same as reported in the main model (Fig. 2). Only standardised scores are reported, intercepts and error term variance are not shown to increase readability; intercepts and error term variances are significant at p < 0.001 level.

significant but small causal effect (0.12). However, the goodness-of-fit indexes (CFI = 0.951 and RMSEA = 0.062) do not meet the conventional thresholds of CFI > 0.95 and RMSEA < 0.05. This indicates that our structural model of Fig. 2, not including income as a mediator, outperforms the revised model including income (Fig. 3). However, we find no significant relationship between income and CMMS, a significant but weak relationship (0.14) between income and EFFS, and a significant relationship (0.26) between income and FB. The fit indexes of the SEM model including income as a mediator between FB and latent components of FWB are CFI = 0.909 and RMSEA = 0.084. Neither of these indexes meets the thresholds.

6. Discussion and conclusions

6.1. General discussion

Research on the factors explaining the differences in financial well-being is still in its infancy (Kaur et al., 2021). So far, the focus has been on conceptualising FWB (Brüggen et al., 2017; Salignac, Hamilton, Noone, Marjolin, & Muir, 2020; Kempson & Poppe, 2018), developing instruments for measuring it (CCPC, 2018; CFPB, 2015; Muir et al., 2017), and analysing its antecedents and outcomes (García-Mata & Zerón-Félix, 2022; Netemeyer et al., 2018). Less has been published on the psychological characteristics affecting FWB, although in a recent study on similar concepts, financial worry and rumination, de Bruijn and Antonides (2020) conclude that further research is needed on psychological characteristics affecting FWB.

In this study, we show that the perception of current and future FWB are affected by psychological characteristics. Our first key finding is that the psychological characteristic that affects one component of FWB does not have a significant effect on the other component, highlighting the need for looking more carefully into the components of FWB and their specific determinants (Riitsalu & van Raaij, 2022), rather than using one-dimensional measures of FWB. More precisely, we found that a higher level of self-control leads to lower current money management stress, but self-control does not affect expected future financial security. With a higher level of self-control people may be able to avoid or reduce money management stress or may be able to overcome the consequences of money management stress. The effect size is large and significant in 15 of the 16 countries studied. Surprisingly, self-control does not affect expected future financial security. One could assume that people with higher self-control are better at controlling their spending and executing their financial plans for the future, but our empirical evidence shows that self-control is relevant for current financial stress and not for expected future financial security.

As a second key finding we found that a stronger future time perspective leads to a higher expectation of financial security in the future for participants in all 16 countries. With a strong future time perspective, people may be focussing on their financial future rather than living only in the present. They may be able to solve the dual-motive conflict by favouring the future option. In this way, they may increase their future financial security. One possible explanation is that future-oriented people are better at delaying gratification, therefore have a higher self-control. However, our data does not allow us to make such assumptions, as these psychological characteristics are not correlated in our study. There is a small effect of FTP on CMMS in half of the countries: those more future-oriented have a little less money management stress, but these effects are not significant in the other half of the countries.

The third key finding is that part of the effects of the psychological characteristics on the components of FWB are mediated by past and present financial behaviour (FB, but there are also direct effects as explained above. This indicates that the relationship between financial behaviours and FWB is more complex than has been assumed so far. The direct effects of the psychological characteristics may not only override the effects of financial knowledge on FWB, as reported by Kempson (2018), but may also override some of the effects of FB as well.

The indirect effects show that people with higher self-control are better at making ends meet and avoiding debt, therefore they have less stress about their finances. However, we did not expect that such a relationship could not be found between SC and EFFS.

The fourth key finding is that income may not play a significant role in FWB as shown so far (Fu, 2020; García-Mata & Zerón-Félix, 2022; Netemeyer et al., 2018). Riitsalu and van Raaij (2022) found that income affects both components of FWB using the same data, but they did not include psychological characteristics or financial behaviours in their models. Our findings show that income influences financial behaviours, and these behaviours affect the components of FWB, but the direct effect of income on FWB is not as large as previously found. However, as our models including income have a poor fit, our findings need to be treated with caution. This calls for further investigation.

Our analysis shows that it is more likely for income to mediate the relationship between FTP and EFFS than the relationship between SC and CMMS. This may be interpreted as a long-term rather than a short-term effect. In a recent paper, Fan & Henager, (2022) also find differences between short-term and long-term (positive) financial behaviours. We obtained weak support for this.

6.2. Practical implications

It may be concluded that self-control reduces current money management stress and future time perspective helps to secure the financial future, in many countries and with large effect sizes. Therefore, these two psychological characteristics should be considered when designing interventions for improving financial well-being.

For example, financial education for people with high and low self-control should be different. For participants with high self-control, financial education could focus on improving understanding of the facts and conditions of financial services as these individuals are able to employ this information in their financial behaviour and resist temptations. For participants with low self-control, the programme should include coaching and training skills and capabilities for increasing self-control, resisting temptations, and changing behaviour in the desirable direction.

Self-control comes close to a permanent and stable personality characteristic (Cobb-Clark et al., 2023) that is difficult to change for many people, but self-control is not completely immutable or unchangeable. Strayhorn (2002) gives 21 guidelines for teaching and training self-control of children. Some of these guidelines may also apply to the financial behaviour of adolescents and adults. Examples of training self-control are promoting goal formation through relationships, adopting distal goals with proximal milestones, and working with a level of goal difficulty adapted to the person. Many hours of practice time may be required for training and coaching to reach results in developing and maintaining a desirable level of self-control. Some researchers suggest extending the time horizon even more and starting before birth: "Improving prenatal and early life environments could improve numeracy, patience and self-control, and general decision-making capacity, all of which contribute to long-term financial outcomes" (Willis, 2021, p. 281).

In the short term, personal finance apps applying behavioural insights may develop and increase both self-control and financial well-being, as recently shown by Bu et al. (2021), and may nudge people to think about their financial future and the needs of their future self (Hershfield, 2011). Goal setting may be used following the guidelines listed above, including coaching, suggestions for specific actions, pre-commitments, and reminders, as suggested by Willis, (2021).

Changes in self-control and future time perspective leading to higher financial well-being may have spill-over effects to other domains of well-being. Good things come in pairs (Hoffmann & Risse, 2020), those with higher self-control may avoid both unhealthy and financially unbeneficial temptations, and therefore have better health as well as higher financial well-being. Financial well-being influences mental health and plays the largest role in subjective well-being (Netemeyer et al., 2018). Well-being in other domains may have components similar to components in the financial domain: the present stress and the expectation of future stress and (in)stability. Coping strategies are moderating the spill-over effects of low well-being between domains (Sirgy et al., 2020). Tuk et al. (2015) conclude that training self-control in one domain will improve self-control in other domains as well.

It may also occur the other way round – a broad range of behaviour change interventions targeting self-control and future time perspective as part of their design, such as initiatives aimed at promoting healthy diets or sustainable 'green' behaviour, may also improve financial well-being. Developing and training healthy or sustainable habits may have spill-over effects on financial well-being, not only as a reduction of expenditure (e.g., cooking at home rather than buying fast food; recycling, repairing, and re-using rather than buying new products) but also as the result of developing stronger self-control and a stronger future time perspective. Reversely, low financial well-being may contribute to lower mental health, lower relationship quality between partners in a household, lower performance at work, at school and at home, and lower general happiness and well-being of people. Therefore, the effects of increasing or securing financial well-being are beneficial in a general sense and may extend far beyond the financial domain.

However, the full responsibility for securing onés financial well-being in the present and future, despite the circumstances, cannot be put on the individuals. As mentioned previously, financial scarcity and hardship may lead to a vicious circle. For reducing income inequality and avoiding the poverty trap, changes in social policy may be needed in addition to financial education or nudges (Riitsalu & van Raaij, 2022; Willis, 2021).

6.3. Limitations and future directions

The first limitation of our study is that the samples of Romania, the Philippines, and Turkey are representative of the online population only. Quota was added on education level and working status for Turkey and on education level for Romania to make these samples more representative for the total population. If more developing countries would have been included in this study, we could have compared the differences between developing and developed countries. However, the size of the current sample (n = 15,773) was already a challenge for structural equation modelling. In these large samples, even small differences may be significant, while the effect sizes may be relatively small. However, we found large effect sizes for most countries.

Another concern in large international studies is the common method variance (Baumgartner & Weijters, 2021). Due to translational or contextual issues, or response styles such as systematic biases in the way individuals respond to questionnaires, the measures may not reliably measure the same constructs in all countries. This was the case with the measurement of EFFS in two countries (Austria and Germany) due to translation (Riitsalu & van Raaij, 2022). Due to measurement invariance problems, we should not compare CMMS and EFFS scores across countries. Thus, we cannot assess and conclude which countries have a high, medium or low level of financial well-being.

A third concern is the limited difference between past and present financial behaviour (FB) and the FWB components CMMS and EFFS, measured as self-descriptions. If possible, in future research these measurement items of past and present financial behaviours and self-descriptions should be differentiated more to avoid overlap and item similarity and thus contamination of variables.

The fourth concern is that we could not add more than four latent variables and their manifest measurement items into the IIS survey due to size restrictions of the questionnaire. In future studies, the relationships between psychological characteristics and financial well-being could be investigated more extensively by including a broader range of psychological characteristics, such as numeracy (the ability to work with numbers and computations) and the approach/avoidance tendency (being attracted to or deterred by financial behaviour and financial problems), and by conducting qualitative research into the meaning and importance of these evaluations and expectations, as perceived by people (Riitsalu et al., 2023).

For future research, the measurement of self-control and future time perspective could be made domain-specific, i.e., focussing on the domain of financial behaviour rather than being at the general level. Van Raaij and Verhallen (1994) distinguish general, domain-specific and brand-specific levels in markets. It may be expected that the domain-specific statements measuring 'financial self-control' and 'financial future time perspective' will provide more power to explain and predict financial behaviour and financial well-being, because both independent and dependent variables are at the same level. At the same time, however, we should be concerned about the contamination (too many similarities) of domain-specific statements for SC and FTP with the statements for the components of

financial well-being CMMS and EFFS. If statements of independent variables become very similar to items of dependent variables, high correlations will be obtained, but little or no explanatory information about size effects and causal directions.

Declaration of Competing Interest

Data availability

Data will be made available on request.

Acknowledgements

References

Antonides, G., de Groot, M. I., & van Raaij, W. F. (2011). Mental budgeting and the management of household finance. *Journal of Economic Psychology, 32*(4), 546–555. https://doi.org/10.1016/j.joep.2011.04.001

Ashton, M. C., & Lee, K. (2007). Empirical, theoretical, and practical advantages of the HEXACO model of personality structure. *Personality and Social Psychology Review, 11*(2), 150–166. https://doi.org/10.1177/1088868306294907

Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist, 37*, 122–147. https://doi.org/10.1037/0003-066X.37.2.122

Baumgartner, H., & Weijters, B. (2021). Dealing with common method variance in international marketing research. *Journal of International Marketing, 29*(3), 7–22. https://doi.org/10.1177/0022242921995871

Bollen, K. A., & Pearl, J. (2013). Eight myths about causality and structural equation models. In S. Morgan (Ed.), *Handbook of Causal Analysis for Social Research* (pp. 301–328). Springer.

Brüggen, E. C., Hogreve, J., Holmlund, M., Kabadayi, S., & Löfgren, 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

Barrafrem, K., Västfjäll, D., & Tinghög, G. (2020). Financial Homo Ignorans: Measuring vulnerability to behavioral biases in household finance. Manuscript submitted for publication. PsyArXiv. https://doi.org/10.31234/osf.io/q43ca.

Bu, D., Hanspal, T., Liao, Y., & Liu, Y. (2021). Cultivating self-control in FinTech: Evidence from a field experiment on online consumer borrowing. *Journal of Financial and Quantitative Analysis.* https://jfqa.org/2021/01/06/cultivating-self-control-in-fintech-evidence-from-a-field-experiment-on-online-consumer-borrowing/.

Ccpc. (2018). *Financial Capability and Well-being in Ireland in 2018* (p. (p. 32).). Competition and Consumer Protection Commission.

CFPB. (2015). *Financial Well-being: The goal of Financial Education* (p. 48). Consumer Financial Protection Bureau. https://files.consumerfinance.gov/f/201501_cfpb_report_financial-well-being.pdf.

CFPB. (2017). *CFPB Financial Well-Being Scale* (p. 54). Consumer Financial Protection Bureau. https://www.consumerfinance.gov/data-research/research-reports/financial-well-being-technical-report/.

Cobb-Clark, D. A., Kong, N., & Schildberg-Hörisch, H. (2023). The stability of self-control in a population-representative study. *Journal of Economic Psychology, 95*, Article 102599. https://doi.org/10.1016/j.joep.2022.102599

Costa, P. T., & McCrae, R. R. (1992). Four ways five factors are basic. *Personality and Individual Differences, 13*(6), 653–665. https://doi.org/10.1016/0191-8869(92)90236-I

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika, 16*(3), 297–334. https://doi.org/10.1007/BF02310555

Dare, S. E., van Dijk, W. W., van Dijk, E., van Dillen, L. F., Gallucci, M., & Simonse, O. (2022). How executive functioning and financial self-efficacy predict subjective financial well-Being via positive financial behaviors. *Journal of Family and Economic Issues.* https://doi.org/10.1007/s10834-022-09845-0

de Bruijn, E.-J., & Antonides, G. (2020). Determinants of financial worry and rumination. *Journal of Economic Psychology, 76*, Article 102233. https://doi.org/10.1016/j.joep.2019.102233

de Ridder, D. T. D., Lensvelt-Mulders, G., Finkenauer, C., Stok, F. M., & Baumeister, R. F. (2012). Taking stock of self-control: A meta-analysis of how trait self-control relates to a wide range of behaviors. *Personality and Social Psychology Review, 16*(1), 76–99. https://doi.org/10.1177/1088868311418749

Fan, L., & Henager, R. (2022). A structural determinants framework for financial well-being. *Journal of Family and Economic Issues, 43*(2), 415–428. https://doi.org/10.1007/s10834-021-09798-w

Fishbach, A., & Dhar, R. (2008). Dynamics of goal-based choice: Toward an understanding on how goals commit versus liberate choice. In *Handbook of Consumer Psychology* (pp. 611–637). Taylor & Francis Group/Lawrence Erlbaum Associates.

Fu, J. (2020). Ability or opportunity to act: What shapes financial well-being? *World Development, 128*, 1–20. https://doi.org/10.1016/j.worlddev.2019.104843

Fujita, K. (2011). On conceptualizing self-control as more than the effortful inhibition of impulses. *Personality and Social Psychology Review, 15*(4), 352–366. https://doi.org/10.1177/1088868311411165

García-Mata, O., & Zerón-Félix, M. (2022). A review of the theoretical foundations of financial well-being. *International Review of Economics, 69*, 145–176. https://doi.org/10.1007/s12232-022-00389-1

Gathergood, J. (2012). Self-control, financial literacy and consumer over-indebtedness. *Journal of Economic Psychology, 33*(3), 590–602. https://doi.org/10.1016/j.joep.2011.11.006

Gerards, R., & Welters, R. (2022). Job search in the presence of a stressor: Does financial hardship change the effectiveness of job search? *Journal of Economic Psychology, 90*, Article 102508. https://doi.org/10.1016/j.joep.2022.102508

Gonçalves, V. N., Ponchio, M. C., & Basílio, R. G. (2021). Women's financial well-being: A systematic literature review and directions for future research. *International Journal of Consumer Studies, 45*(4), 824–843. https://doi.org/10.1111/ijcs.12673

Graham, J. M. (2006). Congeneric and (essentially) tau-equivalent estimates of score reliability. *Educational and Psychological Measurement, 66*(6), 930–944. https://doi.org/10.1177/0013164406288165

Heidegger, M. (1927). *Sein und Zeit [Being and Time]*. Max Niemeyer Verlag.

Hershfield, H. E. (2011). Future self-continuity: How conceptions of the future self transform intertemporal choice. In *Annals of the New York Academy of Sciences, 1235(Decision Making Over the Life Span)* (pp. 30–43). https://doi.org/10.1111/j.1749-6632.2011.06201.x

Hilbert, L. P., Noordewier, M. K., & van Dijk, W. W. (2022a). The prospective associations between financial scarcity and financial avoidance. *Journal of Economic Psychology, 88*, Article 102459. https://doi.org/10.1016/j.joep.2021.102459

Hilbert, L. P., Noordewier, M. K., & van Dijk, W. W. (2022b). Financial scarcity increases discounting of gains and losses: Experimental evidence from a household task. *Journal of Economic Psychology, 92*, Article 102546. https://doi.org/10.1016/j.joep.2022.102546

Hoffmann, A. O. I., & Risse, L. (2020). Do good things come in pairs? How personality traits help explain individuals' simultaneous pursuit of a healthy lifestyle and financially responsible behavior. *Journal of Consumer Affairs, 54*(3), 1082–1120. https://doi.org/10.1111/joca.12317

Hooper, D., Coughlan, J., & Mullen, M. (2008). In A. Brown (Ed.), *Proceedings of the 7th European Conference on Research Methodology for Business and Management Studies* (pp. 195–200). Academic Conferences Limited.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*(1), 1–55. https://doi.org/10.1080/10705519909540118

Husserl, E., Heidegger, M., & Schrag, C. O. (1964). *Vorlesugnen zur Phänomenologie des inneren Zeitbewußtseins [The Phenomenology of Internal Time Consciousness]*. Indiana University Press.

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

Kastenbaum, R. (1961). The dimensions of future time perspective, an experimental analysis. *Journal of General Psychology, 65*, 203–218.

Kaur, G., Singh, M., & Singh, S. (2021). Mapping the literature on financial well-being: A systematic literature review and bibliometric analysis. *International Social Science Journal, 71*(241–242), 217–241. https://doi.org/10.1111/issj.12278

Kempson, E. (2018, November 26). *Financial Capability and Well-Being. An International Comparison*. National Research Symposium on Financial Literacy, Toronto.

Kenny, D. A., & McCoach, D. B. (2003). Effect of the number of variables on measures of fit in structural equation modeling. *Structural Equation Modeling: A Multidisciplinary Journal, 10*(3), 333–351. https://doi.org/10.1207/S15328007SEM1003_1

Kivetz, R., & Keinan, A. (2006). Repenting hyperopia: An analysis of self-control regrets. *Journal of Consumer Research, 33*, 273–282. https://doi.org/10.1086/506308

Kooij, D. T. A. M., Kanfer, R., Betts, M., & Rudolph, C. W. (2018). Future time perspective: A systematic review and meta-analysis. *Journal of Applied Psychology, 103* (8), 867–893. https://doi.org/10.1037/apl0000306

Lang, F. R., & Carstensen, L. L. (2002). Time counts: Future time perspective, goals, and social relationships. *Psychology and Aging, 17*(1), 125–139. https://doi.org/10.1037/0882-7974.17.1.125

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*, 626–638. https://doi.org/10.1007/s10834-020-09678-9

Muir, K., Hamilton, M., Noone, J. H., Marjolin, A., Salignac, F., & Saunders, P. (2017). *Exploring Financial Wellbeing in the Australian Context* (p. 69). Financial Literacy Australia.

Nanda, A. P., & Banerjee, R. (2021). Consumer's subjective financial well-being: A systematic review and research agenda. *International Journal of Consumer Studies, 45* (4), 750–776. https://doi.org/10.1111/ijcs.12668

Netemeyer, R. G., Warmath, D., Fernandes, D., Lynch, J. G., Fischer, E., & Toubia, O. (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

Norman, W. T. (1963). Toward an adequate taxonomy of personality attributes: Replicated factor structure in peer nomination personality ratings. *Journal of Abnormal and Social Psychology, 66*, 574–583. https://doi.org/10.1037/h0040291

Nuttin, J. R. (1985). *Future Time Perspective and Motivation: Theory and Research Methods*. Leuven University Press & Erlbaum.

Nyhus, E. K. (2017). Saving behaviour: Economic and psychological approaches. In *Economic Psychology* (pp. 206–221). John Wiley & Sons, Ltd.. https://doi.org/10.1002/9781118926352.ch13

Oberrauch, L., Kaiser, T., & Seeber, G. (2023). Measuring economic competence of youth with a short scale. *Journal of Economic Psychology, 97*, Article 102633. https://doi.org/10.1016/j.joep.2023.102633

Kempson, E., & Poppe, C. (2018). *Understanding Financial Well-Being and Capability—A Revised Model and Comprehensive Analysis* (Professional Report No. 3; p. 140). Consumption Research Norway - SIFO.

Kempson, E., Finney, A., & Poppe, C. (2017). *Financial Well-Being. A Conceptual Model and Preliminary Analysis* (Project Note No. 3–2017; p. 74). Consumption Research Norway - SIFO. https://www.bristol.ac.uk/media-library/sites/geography/pfrc/pfrc1705-financial-well-being-conceptual-model.pdf.

OECD. (2015). *National Strategies for Financial Education. Policy Handbook*. OECD Publishing. http://www.oecd.org/g20/topics/employment-and-social-policy/National-Strategies-Financial-Education-Policy-Handbook.pdf.

Ponchio, M. C., Cordeiro, R. A., & Gonçalves, V. N. (2019). Personal factors as antecedents of perceived financial well-being: Evidence from Brazil. *International Journal of Bank Marketing, 37*(4), 1004–1024. https://doi.org/10.1108/IJBM-03-2018-0077

Raykov, T. (1997). Scale reliability, Cronbach's coefficient alpha, and violations of essential tau-equivalence with fixed congeneric components. *Multivariate Behavioral Research, 32*(4), 329–353. https://doi.org/10.1207/s15327906mbr3204_2

Riitsalu, L., Atkinson, A., & Pello, R. (2023). The bottlenecks in making sense of financial well-being. *International Journal of Social Economics*. https://doi.org/10.1108/IJSE-11-2022-0741

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, W. F. (2022). Current and future financial well-being in sixteen countries. *Journal of International Marketing, 30*(3), 35–56. https://doi.org/10.1177/1069031X221095076

Rosseel, Y. (2012). lavaan: An R Package for structural equation modeling. *Journal of Statistical Software, 48*, 1–36. 10.18637/jss.v048.i02.

Salignac, F., Hamilton, M., Noone, J., Marjolin, A., & Muir, K. (2020). Conceptualizing financial wellbeing: An ecological life-course approach. *Journal of Happiness Studies, 21*(5), 1581–1602. https://doi.org/10.1007/s10902-019-00145-3

Sekścińska, K., Rudzinska-Wojciechowska, J., & Jaworska, D. (2021). Self-control and financial risk taking. *Journal of Economic Psychology, 85*, Article 102386. https://doi.org/10.1016/j.joep.2021.102386

Sirgy, M. J., Lee, D.-J., Park, S., Joshanloo, M., & Kim, M. (2020). Work–family spillover and subjective well-being: The moderating role of coping strategies. *Journal of Happiness Studies, 21*(8), 2909–2929. https://doi.org/10.1007/s10902-019-00205-8

Steiger, J. H. (2007). Understanding the limitations of global fit assessment in structural equation modeling. *Personality and Individual Differences, 42*(5), 893–898. https://doi.org/10.1016/j.paid.2006.09.017

Strayhorn, J. M. (2002). Self-control: Toward systematic training programs. *Journal of the American Academy of Child & Adolescent Psychiatry, 41*(1), 17–27. https://doi.org/10.1097/00004583-200201000-00007

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

Tangney, J. P., Baumeister, R. F., & Boone, A. L. (2004). High self-control predicts good adjustment, less pathology, better grades, and interpersonal success. *Journal of Personality, 72*(2), 271–324. https://doi.org/10.1111/j.0022-3506.2004.00263.x

Tuk, M. A., Zhang, K., & Sweldens, S. (2015). The propagation of self-control: Self-control in one domain simultaneously improves self-control in other domains. *Journal of Experimental Psychology: General, 144*, 639–654. https://doi.org/10.1037/xge0000065

van Raaij, W. F. (2016). *Understanding Consumer Financial Behavior. Money Management in an Age of Financial Illiteracy*. Palgrave Macmillan US. http://www.palgrave.com/gb/book/9781137544247.

van Raaij, W. F., & Verhallen, T. M. M. (1994). Domain-specific market segmentation. *European Journal of Marketing, 28*(10), 49–66. https://doi.org/10.1108/03090569410075786

Vazsonyi, A. T., Mikuška, J., & Kelley, E. L. (2017). It's time: A meta-analysis on the self-control-deviance link. *Journal of Criminal Justice, 48*, 48–63. https://doi.org/10.1016/j.jcrimjus.2016.10.001

Wilcox, K., Block, L. G., & Eisenstein, E. M. (2011). Leave home without it? The effects of credit card debt and available credit on spending. *Journal of Marketing Research, 48*(SPL), S78–S90. https://doi.org/10.1509/jmkr.48.SPL.S78

Willis, L. E. (2021). Alternatives to financial education. In *The Routledge Handbook of Financial Literacy* (pp. 274–292). Routledge.