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## Full length article

# SaveWise: The impact of a real-life financial education program for ninth grade students in the Netherlands



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## ABSTRACT

This experimental study with a pre-post and follow-up design evaluates the financial education program “SaveWise” for ninth grade students in the Netherlands ( $n = 713$ ). SaveWise adopts a holistic approach, emphasizing action rather than mere cognition. Benefitting from explicit instruction embedded in real-life contexts, students in the program set a personal savings goal and are coached on how to achieve it. The short-term treatment results indicated that SaveWise expanded the students’ level of financial knowledge; encouraged their intentions to save more, spend less and earn an income; and broadly improved their financial and savings behavior. The program demonstrated that it could serve as an effective and low-cost method to enhance the financial literacy of pre-vocational students, a financially vulnerable group. Although long-term effects were expressed only through financial socialization, this study offers evidence linking curricula to increased knowledge and improved behavior for a specific sample of students.

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## 1. Introduction

Finances are part of the daily lives of young people. They are consumers of online purchases and financial services, such as bank accounts and online banking (OECD, 2017). This offers opportunities, but also presents challenges for people who cannot withstand the temptations of online products as shopping and gambling (Amagir, 2020). Social media can drive people to greater consumption: 51% of young people aged between 18 and 21 feel pressured to consume more than they need (Intrum, 2019). Since it is easy to take out loans via smartphones – not just for larger purchases, but also to simply pay bills – young people are increasingly susceptible to financial mismanagement (Intrum, 2019). Moreover, today’s youth is growing up in a society where the financial landscape is increasingly complex and governments are placing more financial responsibilities on them (e.g., student loans). This requires that they take on greater financial

responsibility at a younger age, which can present a considerable challenge (Ali et al., 2014).

There is evidence that young people’s financial situations may be cause for concern. In the Netherlands, to give an example, the proportion of secondary school students who are short of money has grown from 43 percent in 2016 to 55 percent in 2020 (NIBUD, 2020). A financially vulnerable group in the Netherlands are vocational secondary education students. Thirty-seven percent of vocational students aged 18 and over have one or more debts, 48 percent of this group also has student debt (NIBUD, 2015a). Although not all debts are problematic – for instance, student loan debt can represent the opening of doors to future careers – others can create substantial costs and loss of well-being, not only for the debtors, but also for society as a whole (Amagir et al., 2018a). In the Netherlands students borrow more and more often since the basic grant was replaced by a study advance which allows students to borrow an amount equal to the basic grant was (ResearchNed, 2020). Especially students with less affluent parents experience more financial difficulties after the introduction of the loan system than before (ResearchNed, 2020). Young people run a greater risk of carrying substantial

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levels of debt from the very inception of their careers (Avery and Turner, 2012), thereby limiting their financial opportunities (Lusardi et al., 2010). Misguided financial decisions at an early age can have major repercussions for the person concerned, as well as for their families, both in the present and later on in life. Some studies have also found that young people with debts are likely to have to work more and attend school less than their peers (Van der Veer et al., 2019). Debts are also a major driver in career choices (Lusardi et al., 2010), reducing alternatives that might otherwise have been available. Not surprisingly, high debt among young people is related to increased stress and diminished psychological well-being (Norvilitis et al., 2006).

Research indicates that many young people can be considered financially illiterate (Lusardi et al., 2010). In the Netherlands, Amagir et al. (2020) found considerable differences between the financial knowledge levels of 15-year-old students in the lowest Dutch secondary school track (VMBO) and those in the highest track (VWO). These large differences are consistent with the findings of the PISA study among 15-year-olds (OECD, 2017), showing that the widest gaps of knowledge exist between the lowest and highest performing students in the Netherlands and in Beijing–Shanghai–Jiangsu–Guangdong (China). Moreover, Dutch students in the lowest secondary school track tend to behave less responsibly with their finances and are less likely to think about a purchase before deciding (Amagir et al., 2020; OECD, 2017). 19 percent of secondary school students in the Netherlands do not save (NIBUD, 2020). Most students also indicate that they do not have a savings goal or do not save consciously (NIBUD, 2020). Dutch students with a high socio-economic (SES) level and those with mothers who graduated from university have more financial knowledge (Amagir et al., 2020; OECD, 2017). Furthermore, there is a gap in financial knowledge scores between immigrant and non-immigrant students in the Netherlands (Amagir et al., 2020; OECD, 2017) as well as some cultural differences with respect to attitudes towards money (Amagir et al., 2020).

In short, there is an increasing need to improve financial literacy among the young. The evidence illustrates school-based financial education programs as a very effective policy tool to increase financial knowledge and behavior among children and adolescents. A meta-analysis by Kaiser and Menkhoff (2019) shows that school-based financial education significantly affects children's and adolescents' financial behavior (+0.07 SD) and, to an even larger extent, financial knowledge (+0.33 SD). The impact of financial education on financial knowledge is comparable to that of educational interventions in other domains, such as math and reading (Kaiser and Menkhoff, 2019). The recent meta-analysis of Kaiser et al. (2020) confirms this by showing that financial education programs, have on average, positive causal treatment effects on financial knowledge and financial behaviors.

Most of the studies that evaluate school-based financial education have demonstrated that these programs can improve adolescents' financial knowledge (Itebeke et al., 2019; Kalmi, 2018; Shephard et al., 2017; Walstad et al., 2010) and attitudes towards money (Bruhn et al., 2016; Lührmann et al., 2015; Mandell, 2009). Empirical evidence that financial education in school improves financial behavior is still scarce, although on the rise in recent years (Amagir et al., 2018a; Kaiser et al., 2020). Some studies report no effect on savings behavior (Kalmi, 2018; Lührmann et al., 2015) or on subsequent financial behavior (Mandell and Klein, 2009), while others, such as Bruhn et al. (2016), find that sound financial education over a significant period of time impacts students' savings, purchasing and spending behavior, in the short- and long-term. Likewise, Shephard et al. (2017) identified improved savings behavior and self-efficacy, but no influence on savings attitudes. In the Netherlands, there are two studies that evaluate school-based financial education, both in primary

school. The first study found that a 45-min lesson in the form of a Cash Quiz game, administered during the Dutch Money week, improved fifth and sixth graders' financial knowledge and their willingness to save for a desired product (Kalwij et al., 2019). The second study found that two financial education lessons increased fifth graders' knowledge and skills scores in performing transactions effectively, but not in responsible spending (Dare et al., 2020).

Most evaluation studies do not provide insight into financial education instruction and teaching methods (Amagir et al., 2018a). Moreover, more evidence is needed about how to best link curricula to increased knowledge and, more importantly, to improved financial behavior (Danes et al., 2013). The present experimental study, the first in the Netherlands, fills this gap in our knowledge by assessing the effects of a financial education program (SaveWise) on ninth grade students' knowledge, attitudes towards money, self-efficacy, behavior, and financial socialization. SaveWise was developed by the first-listed author and aims at enhancing healthy behavior towards daily financial decision-making for a specific sample of students (Amagir et al., 2019). We conducted an experimental study with a pre-post and follow-up design to evaluate the effects of SaveWise from March to November 2018 among 713 students in the lowest secondary school track.

This paper is structured as follows: the first section gives a brief description of the research context. In the second section an overview of the literature is presented and a description of the financial education program SaveWise. In the third section, the description of the study design, procedure of the treatment, measurements and data analysis is given. In the fourth section, the empirical results of the different multi-level models are presented. Finally, the fifth section provides conclusions and a discussion of the results.

### 1.1. Research context

In order to build financial literacy from an early stage, we decided that the SaveWise program should target ninth grade students in the pre-vocational track (VMBO), the lowest track in Dutch secondary education. The four-year VMBO track is further subdivided into a basic level (VMBO-BK) and a more advanced level (VMBO-GT). In the ninth grade 50.4 percent of the students attend the pre-vocational tracks (Inspectie van het Onderwijs, 2019). Students from socio-economically disadvantaged backgrounds are overrepresented in the pre-vocational tracks in the Netherlands (Shewbridge et al., 2010). The students' age was approximately 15 (Table 1). This is the age at which adolescents start to develop independent behavior, taking on their first financial responsibilities. New opportunities (e.g., a part-time job) allow them to develop the knowledge and skills for conscious financial decision-making, while also developing the unconscious financial habits and heuristics that will drive their everyday financial behavior in adulthood (Drever et al., 2015, p. 26).

In the pre-vocational track, financial education is currently not a mandatory part of the curriculum and is only provided on an irregular basis, as part of economics and social studies classes (Amagir et al., 2020), where limited attention is given to such financial education topics as budgeting or buying goods and services (Money Wise, 2014). Teaching priorities with respect to financial education are determined by the school or individual teachers (Money Wise, 2014).

Design principles SaveWise
Setting a personal savings goal that is specific and challenging enough
Emphasis on doing rather than knowing, real-life contexts
Autonomy in the learning process
Explicit and guided instruction through animated videoclips
Discussing and reflecting on money issues with peers and family through take-home assignments
Behavioral economics insights through the ‘Latte factor’
A holistic approach (i.e. knowledge, attitude, self-efficacy and behavior)

**Fig. 1.** The design principles of SaveWise.  
Source: Based on Amagir et al. (2019).

## 2. Theoretical framework and design principles

We define *financial literacy* as a combination of financial knowledge, attitudes towards money, financial self-efficacy, and financial behavior that supports the application of financial knowledge in daily financial decision-making (Amagir et al., 2018a,b, 2020; Amagir, 2020). *Financial education* is defined as instruction encompassing all of these aspects (Amagir et al., 2019). Generally, the main purpose of financial education is to lay the foundation for a better understanding of financial matters and introduce students to the financial world (Walstad et al., 2010).

In a previous study, we identified and described the design principles for a financial education program called “SaveWise” (Fig. 1). The program was designed by applying the main elements of “experiential learning”, “goal setting theory” and “behavioral economics” to the financial literacy of adolescents (Amagir et al., 2019). SaveWise used a holistic approach to address not only knowledge, but also the other aspects of financial literacy, in order to change adolescent behavior in daily financial decision-making (Amagir et al., 2018b).

Experiential learning is a promising method for teaching financial literacy in secondary schools (Amagir et al., 2018a, 2019; Danes and Haberman, 2007; Harter and Harter, 2010). A key feature of experiential learning is that students are able to identify a relationship between their study and their own prior experiences, which can then be analyzed through reflection, evaluation, and reconstruction in order to establish meaning, thereby leading to further action (Boud et al., 1993; Dewey, 1997[1938]); (Epton et al., 2017; Kolb and Fry, 1975). In SaveWise students choose something to save for which is personally significant or meaningful to them (Boud et al., 1993), taking into account their goals for the future (Harter and Harter, 2009; Mandell and Klein, 2007; Otto, 2013). According to Amagir et al. (2019), setting personal mid- or long-term savings goals function well as a framework for financial education. To increase the likelihood of behavioral change, the goals should be specific, deliberately chosen, and sufficiently challenging (Epton et al., 2017; Locke and Latham, 2002, 2006). SaveWise employs individual goals as well as group goals, and savings behavior is monitored by the teacher and peers (Epton et al., 2017). Crucially, SaveWise emphasizes action (doing) rather than theory (knowing), beginning with the students’ own, real life context (Bruhn et al., 2016; Varcoe et al., 2005). This produces greater personal engagement and, accordingly, a stronger commitment to achieving goals (Amagir et al., 2019). Individual determination to reach a goal is an essential moderator of the link between goals and behavior (Locke and Latham, 1990). According to Amagir et al. (2019), visualizing dreams is a powerful tool to help students stay committed to their savings

goal, even into the longer term. It also stimulates students to be future-oriented, which is also effective for savings (Otto, 2013). To reinforce goal commitment, it is important that students specify in advance what amount should be saved each week or month, and have all the relevant information about their savings goal at their disposal (Amagir et al., 2019). With SaveWise, students set promotional goals (i.e., saving for a certain purchase) rather than prevention-oriented goals (e.g., falling into debt), as promotion goals have been shown to be more motivating (Riitsalu, 2018).

SaveWise incorporates a variety of hands-on activities honoring autonomy in the learning process (Deci and Ryan, 1991) in order to achieve commitment, meaningful learning, intrinsic motivation, and active participation by students in their lessons (Amagir et al., 2018a, 2019). Instructions for hands-on activities are guided and explicit (Kirschner et al., 2006). Most of the lessons in SaveWise are accompanied by animated instructional videos. These are used for purposes of instruction and provide opportunities for students to interact with each other and their teachers in order to form positive attitudes towards money (Amagir et al., 2019). The videos accommodate the students’ limited attention span and their preferred manner of gathering information (Gurvitch and Lund, 2014).

As learning is a socially and culturally defined process (Boud et al., 1993), it is not surprising that involving parents in the financial literacy education of their children has been shown to be fruitful (Bruhn et al., 2016; Harter and Harter, 2009), particularly in the formation of attitudes (Lusardi et al., 2010); (Money Wise, 2014). Hanson and Olson (2018) also suggest that conversations within the family about financial matters has a link with more knowledge regarding financial matters. Therefore, with SaveWise students are encouraged to discuss and reflect on money issues with peers and family by means of take-home assignments (Amagir et al., 2019). In a process designed to increase self-awareness and foster behavioral change (Amagir et al., 2019), students are also told to consider money issues by comparing their own behavior with research data about the typical behavior of their peers. They are taught to identify and avoid small expenses in order to save, using a method known as the “Latte Factor” (Bach, 2003). The Latte Factor helps people understand how small savings can eventually generate a substantial amount through compound interest. Small expenditures, such as for a coffee (café latte) or a bottle of water, are often overlooked, thus eluding recognition in the appropriate mental account (Thaler, 1999).

### 2.1. The financial education program SaveWise: objectives

Following a non-mandatory Dutch financial education framework (NIBUD, 2015b), SaveWise focuses on learning outcomes

that target the competences “spending money responsibly – making choices” and “taking account of future wishes and circumstances – saving and planning” (Amagir et al., 2019). These learning outcomes are akin to those of the PISA subcategory “planning and managing finances” (OECD, 2013). The learning objectives of SaveWise describe knowledge and understanding of financial concepts, as well as skills, attitudes and the self-efficacy, to apply this knowledge in daily financial decision-making. For example, students can make a budget for regular spending and saving, plan ahead by setting a medium- or long-term goal, save money for a large purchase, and search for options to reduce expenses and increase earnings in order to build up savings (Amagir et al., 2019). SaveWise consists of eight weekly lessons, each lasting 50 min. Appendix A lists the learning outcomes targeted in each lesson.

### 3. Method

#### 3.1. Study design and participants

We conducted an experimental study with a pre-post and follow-up design to evaluate the effects of SaveWise from March to November 2018. The pre-test was performed in the first and second weeks of March 2018 and the post-test in June 2018, approximately one week after the intervention ended and approximately four months after the pre-test. A follow-up was executed nine months after the pre-test, in October/November 2018. All tests consisted of a paper-pencil questionnaire to be completed in 25 min. Test taking was supervised by six trained test assistants, who had been instructed to tell the students that tests would be anonymous, would not affect their grades, and that their teachers did not have access to completed questionnaires. Most of the participating schools were part of the alumni network of the department of economics teacher training of the Amsterdam University of Applied Sciences (AUAS), which are mainly located in the western part of the Netherlands. Furthermore, we recruited schools through an open call on the national financial literacy platform: MoneyWise. Within each school, classes were randomly assigned to either the control group or the experimental group. The control group took the regular economics curriculum (business-as-usual instruction). Teachers in the control group did not receive any training or the materials used for the treatment, however they were encouraged to implement SaveWise in their lessons after the follow-up.

In the original sample, 921 students took the pre-test and 813, the post-test. Students who did not finish the questionnaires completely, or who did not take part in both of the tests, were excluded. This resulted in a sample of 315 students in the control group and 398 students in the experimental group, from 42 ninth grade classes, 30 teachers at 16 schools. A power analysis with cluster-RCT indicated that our final sample ( $n = 713$ ) had about 80 percent statistical power at the alpha level of 0.05 to detect an effect size of about 0.45 SD units (42 classrooms and an intraclass correlation of about 0.2).

The follow-up test was administered in the 10th grade among the original sample of students, except for one class due to organizational reasons. All schools and teachers involved in the pre-test also took part in the follow-up test, but the attrition rate for students was 27.4%. This can probably be explained by the absence of students for various reasons and a change in the composition of classes as a result of the transition from 9th to 10th grade. The attrition test showed that the post-test scores of students that were used in the follow-up multilevel analyses do not statistically significantly differ from those of students who were missing from the follow-up test (Appendix B). The final sample taking the follow-up test consisted of 518 students: 222 in the control group and 296 in the experimental group.

Preliminary analyses through Chi-square tests were conducted to examine whether frequency counts were distributed evenly across conditions. As shown in Table 1, no statistically significant differences were found in conditions at the pre-test ( $n = 713$ ) in terms of general characteristics, indicating that the two groups were largely comparable. The non-parametric Mann-Whitney U-test test was used to assess the null hypothesis that the average age was equal across groups, with a statistical significance level of  $p < .05$ . The results show that the age hypothesis was confirmed.

#### 3.2. Procedure and treatment integrity

The eight lessons of SaveWise were taught by economics teachers during economics or social studies classes over a period of twelve weeks. To increase ecological validity, students were taught by their own teachers. Given the importance of training teachers to work with a financial education program (Bruhn et al., 2016; Compen et al., 2018; De Beckker et al., 2019), all teachers followed a three-hour training by the primary researcher in advance of the intervention. They were informed about the aims of SaveWise, its teaching/learning activities, and the core of each of the lessons. Based on classroom pilots during a previous study (Amagir et al., 2019), the primary researcher discussed possible bottlenecks and strategies to deal with them. The information used during the training included the student material, a teacher guide containing learning objectives per lesson, step-by-step instructions per PowerPoint slide, and tips and tricks.

During the intervention period, the primary researcher observed eight lessons at different schools. The teachers recorded the attendance of students and reported their experiences by filling out an online questionnaire after each lesson. Most lessons were performed according to plan. A number of teachers reported a lack of time to discuss all take-home assignments. Data from the observations did not reveal any significant deviations from the teacher guide.

#### 3.3. Measurements

Questionnaires used during the tests consisted of a backgrounds section, a financial knowledge test, and a survey designed to assess attitudes towards money, financial self-efficacy, intentions to save more and spend less and to earn an income, financial behavior, savings behavior, and financial socialization. The questionnaires were presented in machine-readable forms and processed automatically, producing a SPSS data file.

#### Covariates

Previous research has shown that the following characteristics potentially influence financial literacy: age (Lusardi and Mitchell, 2014), gender (Amagir et al., 2020; Lusardi et al., 2010), immigrant background (Amagir et al., 2020; OECD, 2017), students' educational level (basic track or advanced track) (Amagir et al., 2020; Erner et al., 2016), parents' education level (Amagir et al., 2020; Lusardi et al., 2010), and personal financial experiences (i.e., pocket money and part-time job) (OECD, 2017; Sohn et al., 2012). These characteristics were included in our models as control variables.

#### Financial knowledge

To measure knowledge of personal finance, we developed a test consisting of 10 multiple choice questions in three content areas: (1) earning an income; (2) buying goods and services; and (3) savings. We performed a pilot study involving 212 students in the pre-vocational track and performed an item-and-test analysis to confirm the reliability and discriminating power of the financial knowledge test. As a result of the pilot, we modified several individual items on the financial knowledge test (see Appendix C) for the final survey.

**Table 1**  
General characteristics of control and experimental groups ( $n = 713$ ).

	Control group ( $n = 315$ )	Experimental group ( $n = 398$ )	<i>p</i> -value
Age Mean (SD) (at pretest)	15.27 (.612)	15.37 (.663)	.068 <sup>a</sup>
Track			.436 <sup>b</sup>
	Pre-vocational basic	48.6%	
	Pre-vocational advanced	51.4%	
Gender	Female	42.5%	.462 <sup>b</sup>
Student's country of birth	The Netherlands	85.7%	.398 <sup>b</sup>
Father's country of birth	The Netherlands	49.5%	.248 <sup>b</sup>
Mother's country of birth	The Netherlands	49.2%	.345 <sup>b</sup>
Higher education degree: Mother		16.8%	.387 <sup>b</sup>
Higher education degree: Father		20.0%	.657 <sup>b</sup>
Monthly allowance (Yes)		69.5%	.496 <sup>b</sup>
Part-time job (Yes)		34.6%	.233 <sup>b</sup>

<sup>a</sup>Mann-Whitney U-test.

<sup>b</sup>Chi-Square test.

### Attitudes towards money

To measure attitudes towards money, we used a validated scale from a previous study (Amagir et al., 2020). This 23-item scale consists of four subscales – power/prestige, financial planning, thinking before acting, and quality for money – thus covering the psychological aspects of dealing with money (power, success, status, and superiority), money management aspects (e.g., budgeting), and attitudes towards money in situations of consumption (Amagir et al., 2020). Items were rated on a 6-point Likert scale, ranging from “strongly disagree” to “strongly agree” and can be found in Appendix D.

### Self-efficacy

Self-efficacy was measured by presenting students with a list of strategies to stop themselves from spending too much when saving for a particular purchase, based on the “saving strategy self-efficacy scale” of Otto (2009, 2013). In Appendix E you can find the scale that consisted of 9 items combining cognitive and behavioral tactics. Items were rated on a 6-point Likert scale, ranging from “cannot do” to “can do very certainly” (Bandura, 1997).

### Behavior

Behavior was divided into two categories: self-assessment and intended behavior. The first category assessed self-reported financial behavior. It was measured by four items asking the participants how frequently they had engaged in different activities. Such as saving for a particular purchase, budgeting their money, and making ends meet (Amagir et al., 2020). Responses were based on a 6-point Likert scale, ranging from “never” to “very often”.

The second category assessed the intention to deploy good behavior, specifically savings behavior and the intention to save more, spend less, and earn an income.

To assess savings behavior, we adapted Otto's (2009) “savings scale”. The 4 items in this scale were: (1) “What do you usually do with your allowance?”, (2) “What do you usually do with the money you earn?”, (3) “When I get pocket money, I usually..”, and (4) “How do you deal with your money in general?”. The options answering the last item, for example, were: 1: spend it easily and quickly; 2: spend most of it, 3: spend some and save some; 4: spend it carefully and 5: keep as much as I can. A high score on this scale would indicate someone who generally tends to save money.

We also adapted and revised Otto's (2009) scale “strategies for getting larger sums of money”, because we were interested in what students do when confronted with an income constraint problem. The main question presented was: “Sometimes you might find that you want to buy something that costs more

than your monthly income. How would you go about getting the money for the thing you want to buy?”. Ten options for answering this question were presented to students, asking them how likely it was that they would resort to the option chosen. Based on principal component factor analyses and reliability scores, we eliminated four options with regard to borrowing. The remaining six items covered two kinds of intentions: (1) *save more and spend less*, and (2) *earn an income*. The first was assessed with items like “I start saving”, and “I go out/into town less often”, the second with items like “I ask for more shifts at work”. Intentions were measured on a 6-point Likert scale, ranging from “would certainly not do this” to “would certainly do this”.

### Financial socialization

We asked students to what extent they discuss financial matters with their families and peers, and participate in the family's financial decisions. This was measured using seven items with 6-point Likert scales (Amagir et al., 2020), ranging from “never” to “very often” (Appendix F).

The reliability scores for the pre-, post- and follow-up tests were acceptable for all outcome measures with Cronbach  $\alpha$ 's between .65 and .90 (Appendix G).

### 3.4. Data analysis

For illustrative purposes, we present in Appendix H bar graphs showing pre and post-test means and 95% confidence intervals for each outcome variable, for students in the control group and experimental group ( $n = 713$ ). Subsequently a multilevel analysis at school level, classroom level and student level was performed to account for the hierarchical structure of the data, which is commonly found in educational settings (Rasbash et al., 2009). This type of analysis recognizes that individuals sharing the same environment (like a particular school and/or class) have more in common than any arbitrary group of individuals, implying that the data generated by such groups may be interdependent (Hox, 2010).

We first calculated the Intra-Class Correlations (ICC) for the intercept-only model, without explanatory variables to examine whether the data gave reason for a multilevel analysis. The ICC is a measure for the relative distribution of between- and within-group variances (Nezlek, 2008). For financial knowledge in the post-test, the ICC was 0.22; in the follow-up test, it was 0.14. Although the ICCs were small for the subscales attitudes towards money, intentions, self-efficacy, financial behavior and savings behavior (.00 to .05), we decided to perform a multilevel analysis on three levels (school, classroom, and student level), because, according to Nezlek (2008), even when the ICC approaches 0, it can be expected that relationships between or among measures

will vary across groups. The fit of the three-level model (school, class, and student level) was compared to that of the two-level model (class and student level) with a  $\chi^2$  test for all outcome measures. The  $\chi^2$  test showed a statistically significant difference and a better model fit for the three-level model ( $p < .001$ ,  $df = 1$ ). Second, the variable "condition" was added to the model to examine differences between the experimental and the control groups. In a third stage, explanatory variables were added stepwise while testing their fixed effects, starting with the pre-test outcome of each variable, followed by track (1 = basic track, 2 = advanced track), age (centered), gender (1 = girls, 2 = boys), birth country of the student and each of their parents (1 = the Netherlands, 2 = other), university degree of each parent (1 = Yes, 2 = No), monthly allowance (1 = Yes, 2 = No), and having a job (1 = Yes, 2 = No). Multilevel analyses for each outcome variable were conducted separately using the same modeling procedure for both the post- and follow-up tests in a random intercept model. To test the robustness of our results, we also conducted OLS regression with clustered standard errors at the school level for the post and follow-up tests.

Because of multiple testing (eleven outcome variables), we used the Bonferroni correction to set our significance level at  $p < 0.005$  ( $p < 0.05/11$ ; 2-tailed test) for each outcome variable.

The model fit was determined with a log-likelihood test. The  $\chi^2$  difference revealed a significant change ( $p < .001$ ) between the intercept-only model (null model) and the final model, based on the table for critical values of chi-square distributions. Model-based effect sizes were calculated using Cohens'd.<sup>1</sup>

As the missing data was substantial for some covariates (> 5%), we used multiple imputation, which is considered to be a suitable method for dealing with missing data (Tabachnick et al., 2007). During the multiple imputation procedure in SPSS 25, five datasets were created and then pooled into one, which was used in all analyses.

#### 4. Results

In this section, we present the final multilevel models for each outcome variable for the post- and follow-up tests separately. The estimates from the OLS regressions for each outcome variable for the post- and follow-up tests are presented in Appendix I. We found that the regression coefficients of the MLM and OLS regression are largely comparable.

##### Multilevel analyses

###### Financial Knowledge

The results of the multilevel analyses for financial knowledge are set out in Table 2. The estimate condition shows that the experimental group of students scored 0.535 points higher ( $SE = 0.146$ ,  $p = < .001$ ) than the control group: a significant difference with a model-based effect size of 0.24. In the follow-up test, no significant effects were detected. The pre-test scores were strongly related to the post- and follow-up test scores ( $p = < .001$ ). Educational track proved to be a strong predictor for both post-test scores and follow-up test scores. Basic track students scored 1.399 points lower ( $SE = 0.216$ ,  $p = < .001$ ) than advanced track students in the post-test, and 1.338 points lower ( $SE = 0.271$ ,  $p = < .001$ ) in the follow-up test. No statistically significant effects on the financial knowledge post-test scores were found for age, gender, birth country of the students or the parents, university degree of the parents, receiving pocket money and having a part-time job. In the follow-up test, we found a significant age

effect: older students scored lower than younger students ( $p < .05$ ). Students receiving a monthly allowance scored higher on the follow-up test ( $p < .01$ ).

The log-likelihood tests showed a significant fit for the financial knowledge model compared to the null model ( $p = < .001$ ). The total explained variance ( $R^2$ ) was .39 for the post-test, and .22 for the follow-up test.

##### Attitudes towards Money and Self-Efficacy

The multilevel models for the various scales with respect to attitudes towards money and financial self-efficacy are stated in Table 3. The condition estimate shows no statistically significant effects from the experimental condition for either the post-test or the follow-up test.

For the financial planning scale, students in the experimental condition did not score statistically significantly higher than students in the control condition in the post-test ( $B = 0.127$ ,  $SE = 0.065$ ,  $p = .0512$ ,  $d = 0.15$ ). For the follow-up test, we found similar results. Pre-test scores were significant predictors of post-test and follow-up test scores in financial planning ( $p = < .001$ ). Basic track students scored lower in the follow-up test ( $p = .005$ ) than advanced track students, with no significant effects for the other covariates.

With regard to power/prestige, girls scored statistically significantly lower on both the post-test ( $B = -0.230$ ,  $SE = 0.079$ ,  $p = .004$ ) and the follow-up test ( $B = -0.243$ ,  $SE = 0.107$ ,  $p = .023$ ). Students receiving a monthly allowance scored 0.253 points lower ( $SE = 0.108$ ,  $p = .019$ ) on the power/prestige follow-up test. With the exception of the pre-test scores ( $p = < .001$ ), no significant effects were found for the other covariates.

In terms of quality for money, girls scored statistically significantly lower ( $B = -0.168$ ,  $SE = 0.067$ ,  $p = .012$ ) in the post-test. With the exception of the pre-test scores ( $p = < .001$ ), no significant effects were found for the other covariates.

With regard to thinking before acting, basic track students scored 0.299 points lower ( $SE = 0.089$ ,  $p = < .001$ ) on the post-test and 0.256 lower ( $SE = 0.100$ ,  $p = < .05$ ) on the follow-up test than advanced track students. Older students scored higher on the follow-up test than younger students ( $p = < .01$ ). Pre-test scores statistically significantly predicted the post-test scores ( $p = < .001$ ), with no significant effects for the other covariates.

With regard to self-efficacy, no effects were found, with the exception of the pre-test scores that substantially predicted the post-test and follow-up test scores ( $p = < .001$ ).

The total explained variance ranged from  $R^2 = .16$  to .34. Log-likelihood tests showed a significant fit for all models ( $p = < .001$ ).

##### Intentions, Behavior and Financial Socialization

In Table 4, multilevel models are presented for the outcomes from intention to save more and spend less, intention to earn an income, financial behavior, savings behavior and financial socialization.

With regard to intentions, students in the experimental group scored statistically significantly higher on the post-test than students in the control group for the intention to save more and spend less ( $B = 0.286$ ,  $SE = 0.098$ ,  $p = .0035$ ,  $d = 0.26$ ) and the intention to earn an income ( $B = 0.281$ ,  $SE = 0.084$ ,  $p = < .001$ ,  $d = 0.20$ ). No significant effects were found on the follow-up test.

For the intention to save more and spend less, no significant effects were found for the covariates in the post-test, except for the pre-test scores ( $p = < .001$ ). For the follow-up test, basic track students scored lower ( $p = < .01$ ) than advanced track students. Students with a part-time job scored higher ( $p = < .05$ ) on the intention to save more and spend less follow-up test. With the exception of the pre-test scores, no significant effects were found for the other covariates.

<sup>1</sup> According to Cohen (1988), an effect size between 0.2–0.5 represents a small effect, between 0.5–0.8 represents a medium effect, and  $\geq 0.8$  represents a large effect.

**Table 2**  
Multilevel model for financial knowledge.

Effect	Post (n = 713)	Follow-up (n = 518)
	Estimate (SE)	Estimate (SE)
Fixed effects		
– Intercept	6.289 (0.296)***	6.179 (0.405)***
– Condition <sup>a</sup>	0.535 (0.146)***	0.149 (0.175)
Covariates		
– Pretest dependent variable	0.439 (0.035)***	0.219 (0.048)***
– Pre-vocational basic track <sup>b</sup>	–1.399 (0.216)***	–1.338 (0.271)***
– Age (centered)	–0.184 (0.111)	–0.338 (0.145)*
– Gender <sup>c</sup>	0.136 (0.135)	0.225 (0.177)
– Student’s birth country: The Netherlands <sup>d</sup>	0.049 (0.219)	–0.329 (0.315)
– Father’s birth country: The Netherlands <sup>d</sup>	0.037 (0.195)	–0.150 (0.251)
– Mother’s birth country: The Netherlands <sup>d</sup>	0.266 (0.190)	0.290 (0.254)
– College degree Father	0.016 (0.177)	–0.180 (0.204)
– College degree Mother	–0.195 (0.189)	0.284 (0.207)
– Monthly allowance	0.193 (0.149)	0.502 (0.186)**
– Job	–0.108 (0.144)	–0.168 (0.183)
Random effects	Explained variance	Explained variance
– School level (between)	1.127 (.489) .114 (.074)	.709 (.312) .189 (.113)
– Class level (within)	.327 (.157) .026 (.057)	.146 (.269) .107 (.234)
– Student level (within)	3.674 (.201) 2.967 (.162)	4.037 (.359) 3.563 (.315)
– R <sup>2</sup>	.39	.22
– ICC	3.7%	5.0%
–2*log likelihood for null model and final model	3.017.096	2.238.677
and Δ -2LL (Δ df = 12)	2.818.634	2.157.827
	(198.462)***	(80.850)***

<sup>a</sup>Reference category: control condition.

<sup>b</sup>Reference category: Pre-vocational advanced track.

<sup>c</sup>Reference category: boys.

<sup>d</sup>Reference category: other countries.

\*p < .05.

\*\*p < .01.

\*\*\*p < .001.

In terms of intention to earn an income, we found that having a part-time job ( $p = .001$ ) and the pre-test scores ( $p < .001$ ) positively correlate with the post- and follow-up test scores. Older students scored lower in the follow-up test than younger students ( $p < .05$ ), with no significant effects for the other covariates

For financial behavior, students in the experimental condition scored higher on the post-test and follow-up test than students in the control condition. However, this effect is only statistically significant for the post-test ( $B = 0.230, SE = 0.069, p < .001, d = 0.20$ ). The pre-test scores were substantially predicted from the financial behavior post- and follow-up test scores ( $p < .001$ ). We found statistically significant effects in the post-test for age ( $p = .033$ ), birth country of the father ( $p = .015$ ), and university degree of the mother ( $p = .022$ ), implying that older students, students with a father born in the Netherlands and students with a mother who holds a university degree will have higher financial behavior post-test scores. For the follow-up test, we found that younger students ( $p < .01$ ) and students with a part time job ( $p < .001$ ) have statistically significantly higher financial behavior follow-up test scores.

With regard to savings behavior, we found a robust statistically significant condition effect, with students in the experimental condition scoring higher on the post-test than students in the control condition ( $B = 0.277, SE = 0.055, p < .001, d = 0.30$ ). However, there were no statistically significant condition effects for the follow-up test. With the exception of the pre-test scores ( $p < .001$ ), no significant effects were found for the other covariates in both the post- and follow-up test.

For financial socialization, the estimate for the intervention condition indicated that on the pre-test, the experimental condition would score higher on the post-test than the control condition, but not significantly. However, the estimate for the intervention condition also suggested that students in the experimental

group would score statistically significantly higher on the follow-up test than students in the control condition ( $B = 0.237, SE = 0.073, p = .001, d = 0.25$ ). Significant predictors for the post-test scores were the pre-test scores ( $p < .001$ ), age ( $p = .003$ ), gender ( $p = .049$ ) and monthly allowance ( $p = .044$ ). This meant that older students, girls, and students receiving a monthly allowance talk more about money with their parents and peers than younger students, boys and students not receiving a monthly allowance. These predictors are not significant for the follow-up test scores, with the exception of the pre-test scores ( $p < .001$ ).

The log likelihood test showed significant fits for all models ( $p < .001$ ), with a total explained variance ranging from  $R^2 = .20$  to .42.

## 5. Discussion and conclusion

We studied the effect of the financial education program SaveWise on high school students’ knowledge, attitudes towards money, self-efficacy, behavior, and financial socialization. The results show that SaveWise increased the students’ financial knowledge, encouraged their intentions to save more, spend less and earn an income, and improved financial and savings behavior. However, no long-term effects were found. Nevertheless, the positive short-term outcomes with regard to financial and savings behavior contribute to the debate over the effect of financial education on behavior (Fernandes et al., 2014). Although our effect sizes were small, the indications are sufficiently strong to suppose that, with increased intensity of teaching and extension of teaching hours, the financial literacy program could generate more significant effect sizes and lasting outcomes (Kaiser and Menkhoff, 2019). Most individuals do not have enough self-control to resist temptations and primarily seek short-term rewards. As a result, individuals appear to have little or no ability



**Table 3**  
Multilevel models for attitudes towards money and self-efficacy.

	Power/Prestige		Financial Planning		Thinking before acting		Quality for money		Self-Efficacy	
	Posttest	Follow-up	Posttest	Follow-up	Posttest	Follow-up	Posttest	Follow-up	Posttest	Follow-up
Effect Intercept	Estimate (SE) 3.402 (0.146)***	Estimate (SE) 3.184 (0.216)***	Estimate (SE) 4.418 (0.125)***	Estimate (SE) 4.226 (0.162)***	Estimate (SE) 4.637 (0.139)***	Estimate (SE) 4.451 (0.179)***	Estimate (SE) 3.714 (0.128)***	Estimate (SE) 3.369 (0.174)***	Estimate (SE) 4.033 (0.126)***	Estimate (SE) 4.011 (0.165)***
Covariates										
Condition <sup>a</sup>	0.097 (0.075)	0.055 (0.100)	0.127 (0.065)	0.110 (0.073)	0.082 (0.074)	0.005 (0.081)	0.064 (0.066)	0.065 (0.082)	0.002 (0.061)	0.054 (0.075)
Pretest dependent variable	0.481 (0.031)***	0.403 (0.042)***	0.430 (0.033)***	0.443 (0.039)***	0.427 (0.032)***	0.429 (0.038)***	0.371 (0.033)***	0.337 (0.041)***	0.549 (0.029)***	0.548 (0.037)***
Pre-vocational basic track <sup>b</sup>	0.017 (0.081)	0.075 (0.111)	-0.099 (0.092)	-0.256 (0.090)*	-0.299 (0.089)***	-0.256 (0.100)*	0.084 (0.073)	0.090 (0.085)	-0.093 (0.083)	-0.062 (0.090)
Age (centered)	0.059 (0.061)	0.048 (0.083)	0.010 (0.051)	-0.070 (0.061)	0.000 (0.056)	-0.185 (0.068)**	0.019 (0.054)	-0.000 (0.068)	0.046 (0.050)	-0.078 (0.063)
Gender <sup>c</sup>	-0.230 (0.079)*	-0.243 (0.107)*	0.119 (0.062)	0.049 (0.075)	0.111 (0.068)	-0.016 (0.084)	-0.168 (0.067)*	-0.103 (0.086)	-0.085 (0.061)	-0.039 (0.078)
Student's birth country: The Netherlands <sup>d</sup>	-0.018 (0.121)	0.293 (0.183)	-0.165 (0.100)	0.235 (0.134)	-0.065 (0.110)	0.166 (0.148)	-0.158 (0.106)	0.230 (0.149)	-0.057 (0.098)	-0.008 (0.138)
Father's birth country: The Netherlands <sup>d</sup>	0.035 (0.105)	-0.038 (0.143)	0.053 (0.089)	0.132 (0.105)	0.144 (0.097)	0.015 (0.117)	0.117 (0.092)	0.227 (0.116)	0.085 (0.087)	-0.060 (0.108)
Mother's birth country: The Netherlands <sup>d</sup>	-0.089 (0.105)	0.011 (0.145)	0.004 (0.087)	-0.165 (0.107)	-0.094 (0.095)	0.015 (0.118)	-0.098 (0.093)	-0.149 (0.118)	-0.061 (0.086)	0.097 (0.110)
College degree Father	0.001 (0.100)	0.013 (0.119)	0.024 (0.082)	-0.038 (0.087)	-0.015 (0.090)	-0.011 (0.097)	0.069 (0.088)	0.022 (0.097)	-0.018 (0.080)	0.073 (0.090)
College degree Mother	-0.045 (0.106)	0.078 (0.121)	-0.055 (0.087)	-0.056 (0.088)	-0.086 (0.096)	-0.075 (0.098)	-0.014 (0.094)	-0.088 (0.098)	-0.004 (0.086)	-0.139 (0.091)
Monthly allowance	-0.042 (0.084)	-0.253 (0.108)*	-0.033 (0.069)	0.070 (0.079)	-0.075 (0.076)	0.024 (0.088)	0.036 (0.074)	-0.047 (0.089)	-0.022 (0.067)	-0.124 (0.081)
Job	-0.136 (0.080)	0.159 (0.106)	0.012 (0.066)	0.002 (0.078)	-0.099 (0.072)	-0.034 (0.086)	0.031 (0.071)	0.128 (0.086)	-0.066 (0.065)	0.077 (0.080)
Random effects Explained variance:										
- School level (between)	.022 (.019) .002 (.008)	.031 (.029) .006 (.015)	.023 (.018) .020 (.014)	.000 (.000) .000 (.000)	.050 (.032) .009 (.012)	.039 (.026) .012 (.013)	.011 (.011) .002 (.006)	.000 (.000) .000 (.000)	.013 (.013) .013 (.013)	.015 (.017) .008 (.010)
- Class level (within)	.000 (.000) .000 (.000)	.000 (.000) .000 (.000)	.011 (.016) .003 (.011)	.000 (.000) .000 (.000)	.027 (.024) .008 (.015)	.000 (.000) .000 (.000)	.000 (.000) .000 (.000)	.014 (.061) .000 (.000)	.000 (.000) .000 (.000)	.015 (.065) .000 (.000)
- Student level (within)	1.347 (.072) .958 (.051)	1.588 (.100) 1.263 (.079)	.798 (.043) .629 (.034)	.876 (.055) .673 (.042)	.954 (.052) .764 (.042)	1.053 (.066) .826 (.052)	.900 (.048) .740 (.040)	.985 (.086) .843 (.052)	.938 (.050) .611 (.033)	1.028 (.090) .711 (.045)
- R <sup>2</sup>	.30	.22	.22	.23	.24	.23	.19	.16	.34	.32
- ICC	0.2%	0.0%	3.1%	0.0%	1.2%	1.0%	0.3%	0.0%	2.1%	1.0%
-2*log likelihood for null model and final model	2.244.200	1.717.204	1.882.132	1.404.266	2.020.548	1.508.865	1.955.048	1.469.546	1.984.601	1.497.848
and Δ -2LL (Δ df = 12)	1.993.888	1.592.857	1.708.613	1.270.373	1.843.932	1.377.047	1.810.199	1.381.666	1.682.683	1.298.193
	(250.312)***	(124.347)***	(173.519)***	(133.893)***	(176.616)***	(131.818)***	(144.849)***	(87.880)***	(301.918)***	(199.655)***

<sup>a</sup>Reference category: control group.

<sup>b</sup>Reference category: Pre-vocational advanced track.

<sup>c</sup>Reference category: male.

<sup>d</sup>Reference category: other countries.

\*p < .05.

\*\*p < .01.

\*\*\*p < .001.

**Table 4**  
Multilevel models for behavior and financial socialization.

	Intention to save and spend less		Intention to earn an income		Financial behavior		Savings behavior		Financial socialization	
	Posttest	Follow-up	Posttest	Follow-up	Posttest	Follow-up	Posttest	Follow-up	Posttest	Follow-up
Effect Intercept	Estimate (SE) 3.929 (0.153)**	Estimate (SE) 3.775 (0.206)	Estimate (SE) 3.714 (0.164)***	Estimate (SE) 3.673 (0.248)	Estimate (SE) 3.116 (0.138)***	Estimate (SE) 3.344 (0.195)	Estimate (SE) 2.694 (0.111)***	Estimate (SE) 3.134 (0.156)***	Estimate (SE) 2.397 (0.111)***	Estimate (SE) 2.555 (0.162)
Condition <sup>a</sup>	0.286 (0.098)**	0.144 (0.097)	0.281 (0.084)**	0.196 (0.117)	0.230 (0.069)**	0.051 (0.090)	0.277 (0.055)**	-0.097 (0.071)	0.088 (0.056)	0.237 (0.073)**
Covariates										
- Pretest dependent variable	0.440 (0.031)***	0.402 (0.040)***	0.479 (0.028)***	0.332 (0.039)***	0.632 (0.032)***	0.500 (0.041)***	0.663 (0.031)***	0.649 (0.042)***	0.593 (0.032)***	0.511 (0.042)***
- Pre-vocational basic track <sup>b</sup>	-0.177 (0.100)	-0.326 (0.105)**	-0.019 (0.092)	-0.099 (0.121)	0.018 (0.085)	-0.017 (0.104)	-0.083 (0.072)	-0.158 (0.092)	0.094 (0.068)	-0.020 (0.093)
- Age (centered)	0.016 (0.059)	-0.144 (0.079)	0.124 (0.068)	-0.190 (0.097)*	0.119 (0.056)*	-0.083 (0.074)**	-0.038 (0.044)	-0.073 (0.058)	0.135 (0.046)**	-0.014 (0.061)
- Gender <sup>c</sup>	0.110 (0.072)	0.054 (0.098)	0.121 (0.084)	-0.028 (0.119)	0.041 (0.069)	-0.322 (0.092)	0.014 (0.055)	-0.021 (0.072)	0.112 (0.057)*	0.010 (0.075)
- Student's birth country: The Netherlands <sup>d</sup>	-0.006 (0.115)	0.080 (0.174)	0.107 (0.135)	0.069 (0.211)	-0.061 (0.110)	-0.143 (0.164)	0.060 (0.088)	0.041 (0.127)	0.056 (0.090)	-0.051 (0.133)
- Father's birth country: The Netherlands <sup>d</sup>	0.079 (0.102)	0.084 (0.136)	0.126 (0.117)	0.238 (0.165)	0.236 (0.097)*	0.176 (0.128)	0.124 (0.077)	-0.112 (0.100)	-0.034 (0.079)	0.039 (0.105)
- Mother's birth country: The Netherlands <sup>d</sup>	0.003 (0.101)	-0.135 (0.138)	0.049 (0.117)	-0.089 (0.167)	-0.094 (0.096)	-0.249 (0.130)	-0.056 (0.076)	0.076 (0.102)	-0.085 (0.079)	-0.202 (0.107)
- College degree Father	0.013 (0.095)	0.055 (0.114)	-0.097 (0.111)	0.016 (0.138)	-0.144 (0.090)	-0.114 (0.107)	-0.109 (0.072)	-0.059 (0.083)	0.134 (0.074)	-0.073 (0.086)
- College degree Mother	-0.133 (0.100)	-0.127 (0.115)	-0.048 (0.118)	-0.028 (0.140)	0.220 (0.096)*	-0.005 (0.108)	0.035 (0.076)	0.041 (0.084)	-0.027 (0.079)	0.018 (0.087)
- Monthly allowance	-0.009 (0.080)	0.151 (0.103)	0.025 (0.093)	-0.003 (0.125)	-0.004 (0.077)	0.148 (0.097)	0.069 (0.060)	0.082 (0.075)	0.128 (0.062)*	0.075 (0.078)
- Job	0.043 (0.076)	0.255 (0.101)*	0.296 (0.093)**	0.499 (0.127)***	-0.033 (0.075)	0.478 (0.095)***	0.034 (0.058)	0.049 (0.074)	0.074 (0.060)	0.111 (0.077)
Random effects										
Explained variance:										
- School level (between)	.038 (.032) .002 (.015)	.000 (.000) .000 (.000)	.019 (.037) .003 (.012)	.027 (.032) .000 (.000)	.022 (.023) .009 (.009)	.000 (.000) .000 (.000)	.027 (.024) .008 (.007)	.054 (.031) .013 (.012)	.000 (.000) .000 (.000)	.013 (.014) .013 (.012)
- Class level (within)	.044 (.031) .045 (.026)	.275 (.576) .037 (.073)	.081 (.052) .000 (.018)	.000 (.000) .000 (.000)	.018 (.026) .000 (.000)	.000 (.000) .000 (.000)	.037 (.024) .000 (.000)	.088 (.060) .025 (.039)	.022 (.016) .000 (.000)	.000 (.000) .000 (.000)
- Student level (within)	1.088 (.059) .831 (.045)	1.209 (.578) 1.111 (.098)	1.835 (.100) 1.182 (.064)	2.115 (.133) 1.706 (.106)	1.267 (.069) .780 (.042)	1.441 (.125) 1.007 (.063)	.791 (.043) .490 (.026)	.808 (.073) .578 (.051)	.846 (.046) .523 (.028)	.902 (.057) .658 (.041)
- R <sup>2</sup>	.25	.23	.39	.20	.40	.30	.42	.35	.40	.27
- ICC	0.2%	0.0%	0.0%	0.0%	1.1%	0.0%	1.6%	2.0%	0.0%	2.0%
-2*log likelihood for null model and final model and $\Delta$ -2LL ( $\Delta$ $df$ = 12)	2.114.620 1.918.581 (196.039)***	1.662.769 1.542.797 (119.972)***	2.482.720 2.144.757 (337.963)***	1.863.437 1.746.577 (116.860)***	2.208.396 1.852.461 (355.935)***	1.659.615 1.477.607 (182.008)***	1.889.463 1.523.321 (366.142)***	1.426.478 1.215.162 (211.316)***	1.919.572 1.566.174 (353.398)***	1.42 2.542 1.261.081 (161.461)***

<sup>a</sup>Reference category: control group.

<sup>b</sup>Reference category: Pre-vocational advanced track.

<sup>c</sup>Reference category: male.

<sup>d</sup>Reference category: other countries.

\* $p < .05$ .

\*\* $p < .01$ .

\*\*\* $p < .001$ .

to continue working towards long-term goals. A simple, low-cost method of continuing and developing the effectiveness of the SaveWise program would be to regularly remind students to evaluate their savings goals, with a greater focus on self-control issues (Strömbäck et al., 2017), impulse control and discussing how to resist temptations. This could easily be integrated into existing school subjects (e.g., economics or social studies). More research is required to determine whether an increase in teaching hours could in fact assist the long-term results. In their study, Bacon and Stewart (2006) found that after the completion of a course, students tended to forget most of the financial knowledge they had learned. The Bacon and Stewart study suggests that if knowledge is learned at a deeper level, accompanied by repeated testing, it could augment long-term learning outcomes ((Bacon and Stewart, 2006).

We only found long-term effects with respect to students' financial socialization, but no short-term effects. This could be due to a delayed effect as the program motivates students to discuss financial matters with their family and peers, and participate more in their family's financial decisions. This may offer potential for prospective financial education programs to target young people and their parents simultaneously, an opportunity which should be investigated in future research.

We found no significant effects on attitudes towards money. Shim et al. (2010) report that financial knowledge plays an important role in predicting attitudes towards money and is directly linked to financial behavior. Attitudes towards money, in turn, predict financial behavior. Therefore, an important question emerging from this study is how to explain why the effects we found on knowledge, behavior and financial socialization failed to influence attitudes towards money. There may be several explanations. First, SaveWise focused on saving and budgeting by setting a savings goal, which could explain the behavioral change we detected. This is also reflected in the robust effect size of the change in savings behavior. Second, students scored relatively high on the subscales of financial planning and thinking before acting in the pre-test, leaving little room for improvement. Third, while changes in attitude are not entirely impossible, research shows that they vary in the degree to which they are persistent over time and resistant to modification (Maio et al., 2018); (NIBUD, 2012). In addition, no significant effects were found for financial self-efficacy. Like the scores on attitudes towards money, student scores on self-efficacy were relatively high in the pre-test. An explanation may be that, in the pre-test, students overestimated their ability to manage money, leaving little room for improvement as a result of the program. More research is needed to explore how to design financial education programs that can impact attitudes towards money and self-efficacy.

In summary, by adopting a holistic approach in which students set a personal savings goal, by emphasizing actions (doing) rather than theoretical learning (knowing), and by using explicit and guided instruction embedded in real-life contexts, our financial education program has demonstrated that it can serve as an effective and low-cost method.<sup>2</sup> Governments around the world are interested in effective approaches to enhancing financial literacy among their populations (Atkinson and Messy, 2012). Many are in the process of developing, or actually implementing, a national strategy to provide financial education opportunities throughout a person's life and incorporating financial literacy education in school curricula. However, financial education is not currently a mandatory part of the curriculum in the Netherlands. The results of this study show that innovative methods for delivering financial education in high school can be effective in changing

students' financial behavior. Thus, this study validates the need to teach financial education in secondary school, even for a short period of time.

The program SaveWise is frequently used by teachers throughout the Netherlands. Even though the financial education program was developed for the pre-vocational track, teachers of other secondary school tracks also make frequent use of the material that is available for free. Further work needs to be done to establish how the methods incorporated in SaveWise can be applied to different target groups.

### CRedit authorship contribution statement

**Aisa Amagir:** Reviewed the literature, Collected and analyzed the data, Drafted various versions of the paper. **Henriëtte Maassen van den Brink:** Supervision, Discussed and collaborated with the first author during all steps of the research. **Wim Groot:** Supervision, Discussed and collaborated with the first author during all steps of the research. **Arie Wilschut:** Supervision, Discussed and collaborated with the first author during all steps of the research.

### Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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### Compliance with ethical standards

Ethical Approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

### Appendix A-I. Supplementary data

Supplementary material related to this article can be found online at <https://doi.org/10.1016/j.jbef.2021.100605>.

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<sup>2</sup> The program is available free of charge on [www.geldlessen.nl](http://www.geldlessen.nl) to boost the financial literacy of pre-vocational students.

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