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Do savings mediate changes in adolescents' future orientation and health-related outcomes? Findings from randomized experiment in Uganda

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Abstract

Purpose—This present study tests the proposition that an economic strengthening intervention for families caring for AIDS-orphaned adolescents would positively affect adolescent future orientation and psychosocial outcomes through increased asset-accumulation (in this case, by increasing family savings).

Methods—Using longitudinal data from the cluster-randomized experiment we ran generalized estimating equation (GEE) models with robust standard errors clustering on individual observations. To examine whether family savings mediate the effect of the intervention on adolescents' future orientation and psychosocial outcomes, analyses were conducted in three steps: (1) testing the effect of intervention on mediator; (2) testing the effect of mediator on outcomes, controlling for the intervention; and (3) testing the significance of mediating effect using Sobel-Goodman method. Asymmetric confidence intervals for mediated effect were obtained through bootstrapping—to address the assumption of normal distribution.

Results—Results indicate that participation in a matched Child Savings Account program improved adolescents' future orientation and psychosocial outcomes by reducing hopelessness, enhancing self-concept, and improving adolescents' confidence about their educational plans. However, the positive intervention effect on adolescent future orientation and psychosocial outcomes was not transmitted through saving. In other words, participation in the matched Child Savings Account program improved adolescent future orientation and psychosocial outcomes regardless of its impact on reported savings.

Conclusions—Further research is necessary to understand exactly how participation in economic strengthening interventions, for example, those that employ matched Child Savings Accounts, shape adolescent future orientation and psychosocial outcomes: what, if not savings, transmits the treatment effect and how?

Conflict of Interest

The authors declare that they have no conflicts of interest.

Keywords

Child Savings Accounts; AIDS orphans; Uganda; Sub-Saharan Africa; future orientation; psychosocial outcomes; adolescents; economic empowerment; mediation analyses; generalized estimating equation model; randomized controlled trials; experimental study

INTRODUCTION

Adolescent future orientation plays an important role in developing adolescents' resiliency [1] and overall psychological well-being [2], thus impacting adolescents' successful transition to adulthood. Prior studies show a strong association between family socio-economic status (including poverty) and adolescent future orientation [3, 4]. Moreover, assets development theory [5, 6] posits people's behaviors and attitudes are affected by access to and ownership of assets such as financial savings, education (human capital development) and income generating opportunities (economic capital), i.e., assets that lead to accumulation of other assets. These assets have important psychosocial benefits, including higher self-esteem, greater feeling of control over one's life, and greater future orientation. This, in turn, affects the assets-owner freedom to make choices and develop his/her human capability [7]. Thus, asset-based development—a construct within asset-theory—emphasizes efforts that enable people with limited economic opportunities to acquire and accumulate long-term productive assets.

Against that backdrop, the Suubi-Maka intervention being evaluated here employs an asset-based development approach. The intervention uses such assets as children savings accounts, family microenterprises, and scholarships to fight poverty and promote health and social functioning. Assets theorists employing an asset-based development approach would predict that an orphaned adolescent with no belief that he/she has the economic means to afford post-primary education is more likely to have high levels of depression, academic difficulties, and consequently drop out of school [5, 8]. Moreover, this adolescent is less likely to be able or have the desire to avoid negative health consequences. However, provided with the economic means, this adolescent may think and behave differently, staying in school, and avoiding health-risk behaviors. The assumptions advanced by asset-based development theorists are consistent with other behavioral and psychosocial theories (e.g., theory of reasoned action [9]), social learning theory [10], problem behavior theory [11]. Prior studies have illustrated the relationship between asset-ownership and adolescents' health and educational outcomes [11-15].

Within that context, our paper tests the proposition that an economic strengthening intervention for families caring for AIDS-orphaned adolescents would positively affect adolescent future orientation and psychosocial outcomes through increased asset-accumulation (in this case, family savings).

Importance of future orientation for adolescent development

Developmentally, adolescents are capable of envisioning their future. This is referred to as 'future orientation' [16, 17]. To measure adolescent future orientation—defined as attitudes

and behaviors that lead to forming expectations for the future, and setting goals and aspirations [18]—studies examine adolescent hope and optimism about the future, career prospects, belief in their control over future events, and view of “possible selves” defined as positive and negative images of self in a future state [19].

Adolescent future orientation may be a significant predictor for a range of educational, health, and psychosocial outcomes. Hopelessness is a key factor that increases the likelihood of adolescents engaging in problem behaviors [11]. Adolescents with a negative future orientation are less concerned about the consequences of risk-taking behavior, and, consequently are less likely to avoid health risk-taking behavior. On the other hand, adolescents with a positive future orientation are less likely to engage in health risk-taking behavior including substance abuse [20] and sexual risk-taking [21].

Effect of orphanhood and poverty on adolescent future orientation

Adolescents’ outlook about their future can be learned through social interactions, including family communication. Studies show that relationships with caring adults facilitate development of positive future orientation in adolescents [1, 22]. Conversely, lack of caring adults may impair the development of adolescents’ positive future orientation. Within that context, several studies have documented low future expectations, hopefulness, and self-esteem among orphaned adolescents compared to non-orphaned adolescents [23, 24].

Currently, about 2.7 million children and adolescents in Uganda are orphans; and more than one-third of these are AIDS-orphans [25]. Very often, orphaned adolescents live in poverty. Many live in either child-headed households or with their extended family members with limited financial resources. Living in poverty negatively impacts adolescent future orientation [21, 26]. Poverty has the potential to discourage adolescents from thinking positively about their future [27]. Adolescents from poor families have lower educational expectations due to their inability to pay for school. Without an education, poor adolescents envision restricted career prospects. Consequently, these adolescents are less optimistic about their future [4].

Conversely, accumulation of financial assets may improve future orientation by leading to higher self-esteem and the feeling of increased control over one’s life [6, 13, 28, 29]. However, this argument—advanced by asset theory (described earlier) has not been extensively tested specifically among adolescents whose decisions early in life are likely to impact them for many years to come [30]. Thus, this paper: 1) tests the impact of a family economic strengthening intervention, Suubi-Maka, on future orientation and psychosocial outcomes of adolescents orphaned by AIDS; and 2) ascertains the extent to which accumulation of financial assets (through savings) mediates the observable intervention effects.

METHODS

Data

We use longitudinal data collected from a cluster-randomized experiment (hereafter, *study*) called Suubi-Maka. The study was situated in 10 public primary schools in Rakai and

Masaka Districts of Uganda—two districts heavily affected by HIV/AIDS. The 10 schools included in the study were selected from 42 primary schools within the Diocese of Masaka (in Rakai and Masaka Districts) with the following specifications: 1) location (rural or peri-urban), 2) student population (average 600 students in primary grades 1-7); and 3) comparable level of performance based on Primary Leaving Examinations (PLE)—a nationally administered examination for all students transitioning from primary school to high school in the Ugandan education system.

Randomization was conducted at the school level. Five schools (n=179 dyads, that is, adolescents and their caregivers) were randomly assigned to the treatment group, and 5 schools (n=167 dyads) were randomly assigned to the control group. To be included into the study, each adolescent had to meet the following criteria: (1) an AIDS-orphan, having lost one or both parents to HIV/AIDS; (2) enrolled in the last two years of primary school; and (3) living within a family setting. In addition, each adolescent, together with his/her guardian/parent had to express an interest in participating in the study, and had to provide informed assent (in case of adolescents) and informed consent (in case of guardians/parents) [31].

Study intervention

Each adolescent in the control group received enhanced usual care for orphans in the study region, which comprised of counseling, food aid (school lunches), scholastic materials (textbooks and notebooks), and mentorship. Usual care services were provided through the Diocese of Masaka, the local implementing partner institution.

Adolescents in the treatment group received everything included in enhanced usual care described above, plus: (1) a matched savings account (Child Savings Account – CSA) held in the adolescent's name with his/her parent/guardian as a co-signatory in a recognized financial institution. Financial institutions require parents/guardians to be co-signatories on accounts for their legal dependents if the adolescents are minors under age 18. It is also important to note that any of the adolescent's family members, relatives, or friends were allowed, and indeed encouraged, to contribute towards the CSA. The account was then matched with money from the intervention program. The match cap (the maximum amount of family contribution to be matched by the program) was an equivalent of US\$10 a month per family or US\$200 for the 20-month intervention period. The match rate was 2:1. This means that if an adolescent in the treatment group had an equivalent of US\$10 deposited each month in the CSA for 20 months (without withdrawing the deposited amount), at the end of the 20-month intervention period, this adolescent would have a total of US\$200 in the CSA, which would then be matched by US\$400 (2:1 match rate) using funds from the intervention program. This would give the adolescent a total of US\$600 (savings + the match) over a period of 20 months. The matched amount could be used to pay for post-primary education/training, or investing in an income generating family business. The matched funds were kept in a separate account from a participant's own savings and were not accessible to the participant. When a participant was ready to attend post-primary school, the bank check/voucher for the matched funds was written directly to the school the student selected to attend. The student then contributed his/her portion (1/3) of the total cost

for the academic term. If the adolescent withdrew his/her personal savings for purposes other than those specified by the Suubi-Maka intervention, the participant would forfeit the associated match. The process was intended to avoid potential misuse of the matched funds by the adolescent's family members or guardians. 2) In addition to the matched CSA, participants in the treatment group and their guardians were required to attend four training sessions on financial management. Specifically, financial management training sessions covered: microenterprise development principles, working with financial institutions, savings and investment, and goal-specific training focused on particular businesses (e.g., chicken rearing) that participants selected to undertake.

Measures

We use the following indicators to measure adolescent future orientation and psychosocial outcomes:

1. Beck Hopelessness Scale (BHS)—a 20-item self-report inventory administered with adolescent and measuring adolescent's pessimistic outlook and negative expectations about events in her/his future [32, 33]. Each item on the BHS is a binary variable with two response categories (True/False). The score ranges from 0 (no hopelessness—meaning being hopeful) to 20 (absence of all hope—being hopeless). The measure has a Cronbach's alpha of 0.68 at baseline and 0.7 at both 12-month and 24-month follow-up.
2. Tennessee Self-Concept Scale—a 20-item scale, ranging from 5 to 100, with a higher score corresponding to a higher self-concept. The scale contains questions asked from adolescents and measuring adolescent's physical, moral, personal, family, social and academic self-concept perception of self. The measure has high internal consistency with a Cronbach's alpha 0.74 at baseline, 0.77 at 12-month follow-up, and 0.81 at 24-month follow-up.
3. Adolescent's confidence in educational plans after primary—a binary variable dichotomized as 0 = “Not very sure about planning to start secondary school”, and 1 = “Very sure about planning to start secondary school”.
4. Adolescent's educational expectations—an ordinal variable corresponding to the question asked to adolescents “Thinking back on the questions you have answered so far, how far do you really believe you will go in school?”. The measure has five response categories ranging from: 1 = “Dropout before completing secondary school”, 2 = “Complete secondary school and stop”, 3 = “Go on to technical college”, 4 = “Go on to the university to get a degree”, 5 = “Finish university and go on to graduate school to get a second degree”.

Four measures are used separately as mediators: (1) guardian's self-reported savings and (2) adolescent's self-reported savings—both obtained using the following question: “Do you currently have any money saved anywhere?” (Yes/No); (3) saved amount, as reported by guardians, and (4) saved amount, reported by adolescents. The saved amount was obtained using the question “How much money do you currently have saved”, asked separately to the adolescent and to the guardian. The measure of saved amount was transformed by natural log.

The analyses include demographic covariates, such as the adolescent's age and gender. We also control for quality of family relations, using family cohesion reported by the adolescent. The family cohesion measure is a 26-item index with Cronbach's alpha of 0.79 at baseline, 0.78 at 12-month follow-up, and 0.79 at 24-month follow-up.

The Suubi-Maka study was designed and implemented as a dyad study, with data being collected from adolescents and their caregivers at baseline, 12-month follow-up, and 24-month follow-up.

Study hypothesis

We offer the following two hypotheses:

1. Following the intervention initiation, at 24-month follow-up, adolescents in the treatment group will have lower levels of hopelessness, higher scores in the self-concept scale, greater confidence in educational plans, and greater educational expectations, compared to adolescents in the control group (main treatment effect).
2. Compared to the control group, participation in the treatment group will improve adolescents' future orientation and psychosocial outcomes at 24-month follow-up by increasing family reported savings at 12-month follow-up (mediation effect).

Analyses

Descriptive analyses of the sample at baseline were conducted using the Stata survey command (-svy-) accounting for cluster randomization at school level. Description of sample at baseline contains adjusted Wald F-statistics (design-based F) to examine individual-level variations while accounting for potential correlation between same-school observations. The study was sufficiently powered to obtain small and medium effect sizes (for detailed power analyses of the study see [31])

Further, to test our hypotheses, we ran generalized estimating equation (GEE) models with robust standard errors clustering on individual observations (xtgee command in Stata 13). GEEs are models that estimate population-averaged treatment effects (instead of a subject-specific treatment effect), while accounting for within-subject correlations among responses over time, and allows for time-varying covariates. Although data is clustered within schools, the number of schools is too small ($n=10$) to treat schools as a level. Per Joop Hox's "30/30 rule of thumb," for estimates and their standard errors to be accurate, multilevel data should comprise at least 30 groups with at least 30 cases per group [34]. Therefore, in the analyses, we treat schools as nested fixed effects—using series of dummies for schools. The fixed effects dummies account for all the school-level variance. Therefore, the school-level residual is estimated as zero—which serves the purposes of avoiding school-level correlation. The use of robust standard errors guards against most model violations.

To examine whether family savings mediate the effect of the intervention on adolescents' future orientation, analyses were conducted in three steps. The first step tested the significance of the intervention on the mediator using GEE. The main question of interest at this step was: whether the mediator at 12-month follow-up differs significantly between the treatment and control groups as a result of the intervention.

The second step, also using GEE, examined the effect of the mediator on the outcome, controlling for the intervention. In this step, the mediator and the outcome may potentially be associated because they are both affected by the intervention. Therefore, it is important to control for the effect of the intervention, as well as for the effect of time [35, 36]. The main question of interest at this step was: whether, controlling for the intervention, change in the mediator (from baseline to 12-month follow-up) affects change in the outcome through the study period (that is, from baseline to 12-month follow-up, and to 24-month follow-up).

Finally, the third step tests the significance of mediating effect using Sobel-Goodman method. This method uses product of coefficient approach, where the product of two coefficients—outcome regressed on the mediator and mediator regressed on the predictor—is obtained, and tested for significance [37]. This method also allows defining proportion of total effect that was mediated. We applied Sobel-Goodman method using `<sgmediation, prefix(svy:)>` command in Stata 13, to account for clustering of data within schools. Furthermore, to obtain asymmetric confidence intervals for mediated effect, bootstrapping was conducted, which addresses the main limitation of product of the Sobel-Goodman test (i.e. assumption of normal distribution), and is better suited for small-size samples [38].

RESULTS

Description of the sample

Table 1 indicates that at baseline (before the intervention) the treatment and control groups did not differ significantly on major covariates.

Main effect of intervention

Table 2 presents results of GEE regression on adolescent future orientation, as measured by (1) adolescent's score on the Beck Hopelessness Scale; (2) Tennessee Self-Concept Scale; (3) adolescent's confidence in educational plan after completing primary; and (4) adolescent's educational expectations.

Results show that at 24-month post intervention initiation adolescents in the treatment group reported lower levels of hopelessness, higher scores on the Tennessee Self-Concept Scale, and greater confidence in planning to go to secondary after finishing primary, compared to adolescents in the control group.

Mediation effect of family saving

To test the mediation effect of family saving, first we tested the intervention effect on each mediator separately. We found that for both guardians and adolescents, the odds of reporting having saved money were higher in the treatment group, compared to the control group, at both 12-month follow-up and 24-month follow-up. We also found that both guardians and adolescents in the treatment group reported saving greater amounts, compared to the control group at both 12-month and 24-month follow-up (see Table 3).

After establishing the significant intervention effect on all four mediators, we tested whether, controlling for the intervention, change in the mediator from baseline to 12-month follow-up—in other words, change in the proportion of adolescents and their caregivers who

reported saving money, and change in the reported amount saved—leads to the change in outcomes from baseline to 24-month follow-up (results described in Table 4). This test was run only for outcomes significantly affected by the intervention at 24-month follow-up. Therefore, adolescent educational expectations are excluded from this test.

We found that change in either guardian (Table 4) or adolescent (Table 5) reported savings had no effect on adolescent future orientation measures. Furthermore, the intervention effect on the Beck Hopelessness Scale and adolescents' confidence in educational plans was still significant after adding the mediators. This implies that neither guardian nor adolescent savings transmitted (mediated) the intervention effect on these two outcomes.

After adding adolescent's reported savings as a mediator, the main intervention effect on adolescent self-concept disappeared (Table 5). This may suggest a possible mediation effect. However, additional analysis using the Sobel Goodman test showed only 10% of the total effect being mediated; and the mediating coefficient was not statistically significant—hence ruling out any mediation possibility.

DISCUSSION

Two main findings came out of this study. On the one hand, we found that participation in a matched CSA program improved adolescents' future orientation and psychosocial outcomes by reducing hopelessness, enhancing self-concept, and improving adolescents' confidence about their educational plans. This finding is consistent with earlier findings that point to the positive impact of participation in savings programs and planning for the future [5, 6].

However, we also found that the positive intervention effect on adolescent future orientation and psychosocial outcomes was not transmitted through saving. Participation in the matched Child Savings Account program improved adolescent future orientation and psychosocial outcomes regardless of its impact on reported savings. The asset accumulation opportunity produced positive effects on adolescents' future orientation and psychosocial outcomes whether or not families saved.

This finding can partially be explained by the “bundled” nature of the intervention which included the following: (1) matched Child Savings Account, and (2) financial training. Due to the study design, we cannot disentangle the individual effect of each specific component of the intervention. It is possible that the positive effect of the intervention on adolescent future orientation is due to a sense of hope, the promise of a better future, rather than an actual increase in asset accumulation. Notably however, the effects we captured are over and above enhanced usual care. There is something about the Suubi-Maka intervention that is producing the observable results.

Our study contributes to the existing knowledge gap with regard to the factors that may be affecting adolescent future orientation. The study adds to the dearth of literature on future orientation of orphaned adolescents in sub-Saharan Africa by testing the effect of participation in an economic strengthening intervention on adolescent future orientation. Moreover, it uses a longitudinal and cluster-randomized experimental design to test whether assets (i.e. savings) accumulated in matched Child Savings Accounts mediate the effect of

the intervention on adolescent future orientation. This is one of the first studies to collect data from both the adolescents and their primary caregivers to address this important question. Furthermore, mediation analyses conducted in this paper are the first attempt to gain insight into the specific role of savings in transmitting the effect of a family-based economic empowerment intervention on adolescent future orientation.

Two main limitations of our study are (1) using self-reported savings; and (2) small number of clusters. The reason behind using self-reported savings was the availability of this data for both the treatment and control groups at all three assessment points (unlike administrative data on savings available post-intervention for the treatment group only). Bivariate analyses show some association between the self-reported and administrative data from the financial institutions holding the participants' savings accounts (for details see [31, 39]).

The significant effect of the matched Child Savings Accounts program on adolescent future orientation and psychosocial outcomes underscores the need for closer attention to poverty reduction and economic strengthening initiatives. Findings from the study suggest that economic strengthening interventions, including those that use matched Child Savings Accounts, may be an important tool for improving adolescent future orientation and psychosocial outcomes. However, further research is necessary to understand exactly how participation in economic strengthening interventions, for example, those that employ matched Child Savings Accounts, shape adolescent future orientation and psychosocial outcomes: what, if not savings, transmits the treatment effect and how?

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Implications and Contribution

Our study shows that participation in a matched Child Savings Account intervention improved adolescents' future orientation and psychosocial outcomes, regardless of one's level of saving. Further research is necessary to understand what, if not savings, mediate the positive effects of participation in savings-led interventions, such as matched Child Savings Accounts."

Table 1

Description of the sample at baseline (N=346)

Variables	Percent or Mean [95% Confidence Interval]			
	Total (N=346)	Treatment (n=179)	Control (n=167)	Design-based F
Covariates				
Adolescent's age (Mean; range: 10-17)	13 [13; 14]	13 [13; 14]	13 [13; 14]	F(1,9)=0
Female adolescent (%)	65 [57.2; 72.1]	65.4 [53; 75.9]	64.7 [54.8; 73.5]	F(1,9)=0.01
Family cohesion reported by adolescent (Mean; range: 1-5)	3.8 [3.77; 3.88]	3.8 [3.7; 3.9]	3.8 [3.8; 3.9]	F(1,9)=0.14
Mediator				
Adolescent reports saving? (% , YES)	10.1 [12.7; 27.7]	20.1 [14.1; 27.8]	18 [8.2; 35.1]	F(1,9)=0.1
Adolescent reported amount saved (LOG)	−0.23 [−1.02; 0.56]	−0.16 [−0.7; 0.4]	−.03 [−1.8; 1.2]	F(1,9)=0.04
Guardian reports saving? (% , YES)	34.1 [24.2; 45.7]	39.7 [23.6; 58.3]	28.1 [22.7; 34.3]	F(1,9)=2.12
Guardian reported amount saved (LOG)	2.36 [0.92; 3.9]	3.2 [0.76; 5.7]	1.4 [0.71; 2.1]	F(1,9)=2.56
Outcome measures: Adolescents' future orientation				
Beck Hopelessness Scale (Mean; range: 0-20)	5 [5; 6]	6 [5; 6]	5 [4; 6]	F(1,9)=1.9
Tennessee Self-Concept Scale (Mean; range: 5-100)	78 [77; 79.5]	77.8 [76; 79]	79.98 [77; 80.6]	F(1,9)=1.51
Adolescent's confidence in educational plans (%)				F(1,9)=0.55
<i>Very sure about planning to start secondary school</i>	78.3 [72.6; 83.1]	79.9 [72.5; 85.7]	76.5 [68; 83.4]	
<i>Not very sure about planning to start secondary school</i>	21.7 [16.9; 27.4]	20.1 [14.3; 27.6]	23.5 [16.6; 32]	
Adolescent's educational aspirations (%)				F(2, 17)=2.51
<i>Drop at any stage before completing secondary school</i>	9.6 [6.4; 14.1]	11.7 [6.6; 20.1]	7.2 [4.2; 11.9]	
<i>Complete secondary school and stop</i>	9.8 [6.8; 13.9]	12.9 [8.5; 18.9]	6.6 [4.8; 8.9]	
<i>Go on to technical college</i>	12.1 [6.1; 22.9]	8.4 [2.2; 26.9]	16.2 [7.5; 31.6]	
<i>Go on to the university to get a degree</i>	31.2 [24.2; 39.2]	25.1 [19.7; 31.5]	37.7 [28.9; 47.4]	
<i>Finish university and go on to graduate school to get a second degree</i>	37.3 [30.2; 44.9]	41.9 [32.9; 51.4]	32.3 [25.6; 39.8]	

*p 0.05, **p 0.01, ***p 0.001. **Boldface** type indicates statistically significant results.

Table 2

Effect of the intervention on adolescent's future orientation

VARIABLES	Beck Hopelessness Scale		Tennessee Self-Concept Scale		Adolescent's confidence in educational plans		Adolescent's educational expectations	
	<i>B</i> coef	95% CI	<i>B</i> coef	95% CI	<i>OR</i>	95% CI	<i>B</i> coef	95% CI
Marginal intervention effect at Wave 2	-1.18**	[-2; -0.4]	1.35	[-1.1; 3.7]	1.1	[0.7; 1.7]	0.54**	[0.1; 0.9]
Marginal intervention effect at Wave 3	-1.49***	[-2.2; -0.7]	2.92*	[0.2; 5.6]	2.4**	[1.3; 4.2]	0.23	[-0.2; 0.6]
Adolescent's age	0.14	[-0.0; 0.3]	-0.85**	[-1.5; -0.2]	1.1	[1.0; 1.2]	-0.15***	[-0.2; -0.1]
Adolescent's gender (base: male)	-0.80**	[-1.3; -0.3]	1.27	[-0.3; 2.8]	1.0	[0.8; 1.3]	0.57***	[0.4; 0.8]
Family cohesion	-0.44	[-0.9; 0.0]	5.01***	[3.5; 6.5]	1.1	[0.9; 1.4]	0.09	[-0.1; 0.3]
School fixed effects								
School 1	0.75	[-0.3; 1.8]	-0.61	[-4.7; 3.5]	1.1	[0.6; 2.1]	-0.75**	[-1.2; -0.3]
School 2	-0.04	[-0.8; 0.8]	-0.28	[-2.9; 2.3]	2.1**	[1.2; 3.5]	0.28	[-0.1; 0.6]
School 3	-0.13	[-1.0; 0.7]	0.25	[-2.6; 3.1]	1.6*	[1.0; 2.7]	0.41*	[0.0; 0.8]
School 4	-0.27	[-1.5; 1.0]	1.22	[-2.5; 5.0]	1.0	[0.6; 1.6]	0.03	[-0.5; 0.6]
School 6	0.81	[-0.1; 1.7]	-4.15*	[-7.6; -0.7]	0.5*	[0.3; 0.9]	-0.49*	[-0.9; -0.0]
School 7	1.38*	[0.3; 2.5]	-6.36***	[-9.9; -2.8]	0.4**	[0.3; 0.7]	-0.80**	[-1.3; -0.3]
School 8	1.16*	[0.0; 2.3]	-3.55	[-7.3; 0.2]	0.6	[0.3; 1.0]	-0.45	[-1.0; 0.1]
School 9	0.47	[-0.5; 1.4]	-3.96*	[-7.2; -0.7]	1.0	[0.6; 1.7]	-0.10	[-0.5; 0.3]
Constant	4.62**	[1.5; 7.7]	74.15***	[63.1; 85.2]	0.7	[0.1; 3.8]	5.55***	[4.0; 7.1]
Observations	994		994		859		935	
Number of adolescent ID	346		346		337		346	

Boldface type indicates statistically significant results.***
p<0.001,**
p<0.01,*
p<0.05.

Table 3

Effect of the intervention on mediator

VARIABLES	GUARDIAN				ADOLESCENT			
	Self-reported saving		Self-reported amount saved		Self-reported saving		Self-reported amount saved	
	OR	95% CI	B coef	95% CI	OR	95% CI	B coef	95% CI
Marginal intervention effect at Wave 2	1.85*	[1.13; 3.04]	1.63*	[0.2; 3.1]	2.68**	[1.42; 5.05]	2.69***	[1.5; 3.9]
Marginal intervention effect at Wave 3	1.93*	[1.15; 3.26]	2.32**	[0.8; 3.8]	2.44**	[1.25; 4.79]	3.18***	[1.8; 4.6]
Adolescent's age	1.04	[0.89; 1.21]	0.14	[-0.3; 0.6]	0.98	[0.85; 1.13]	0.01	[-0.3; 0.3]
Adolescent's gender (base: male)	1.01	[0.68; 1.50]	-0.00	[-1.2; 1.2]	0.43***	[0.29; 0.63]	-2.19***	[-3.0; -1.3]
Family cohesion	0.84	[0.65; 1.09]	-0.60	[-1.4; 0.2]	1.16	[0.84; 1.62]	0.19	[-0.5; 0.9]
School fixed effects								
School 1	1.07	[0.50; 2.31]	-0.04	[-2.6; 2.5]	0.68	[0.29; 1.61]	-0.83	[-2.7; 1.0]
School 2	1.47	[0.76; 2.85]	1.42	[-0.8; 3.6]	0.64	[0.35; 1.15]	-0.89	[-2.3; 0.5]
School 3	3.19**	[1.58; 6.42]	3.87***	[1.7; 6.0]	1.02	[0.55; 1.90]	0.11	[-1.3; 1.5]
School 4	1.33	[0.57; 3.10]	0.80	[-1.9; 3.5]	0.89	[0.40; 1.96]	-0.32	[-2.2; 1.6]
School 6	1.88	[0.67; 5.27]	1.55	[-0.9; 4.0]	0.85	[0.32; 2.29]	-0.37	[-2.2; 1.4]
School 7	2.09	[0.69; 6.30]	1.92	[-0.8; 4.7]	3.32*	[1.23; 9.00]	2.81**	[0.7; 5.0]
School 8	3.44*	[1.10; 10.72]	3.51*	[0.5; 6.5]	1.62	[0.54; 4.85]	0.68	[-1.5; 2.9]
School 9	1.88	[0.67; 5.26]	1.38	[-1.0; 3.8]	0.63	[0.24; 1.65]	-0.88	[-2.5; 0.8]
Constant	0.23	[0.02; 3.22]	0.23	[-7.4; 7.9]	0.20	[0.01; 2.69]	0.03	[-5.5; 5.5]
Observations	974		974		993		993	
Number of adolescent ID	346		346		346		346	

Boldface type indicates statistically significant results.***
p<0.001,**
p<0.01,*
p<0.05.

Table 4

Mediation effect of guardian's saving

	Beck Hopelessness Scale				Tennessee Self-Concept Scale				Adolescent's confidence in educational plans			
	Reported saving	B coef	95% CI	Reported amount saved	Reported saving	B coef	95% CI	Reported amount saved	Reported saving	B coef	95% CI	Reported amount saved
Change in mediator from Wave 1 to Wave 2	0.20		[-0.3; 0.7]	0.02			[-1.9; 0.8]	-0.06			[-0.2; 0.0]	1.019
Marginal intervention effect at Wave 3	-1.50***		[-2.3; -0.7]	-1.50***			[0.0; 5.5]	2.77*			[0.0; 5.5]	2.265**
Adolescent's age	0.14		[-0.0; 0.3]	0.14			[-1.4; -0.1]	-0.76*			[-1.4; -0.1]	1.093
Adolescent's gender (base: male)	-0.75**		[-1.3; -0.3]	-0.76**			[-0.3; 2.9]	1.29			[0.82; 1.4]	1.060
Family cohesion	-0.45*		[-0.9; -0.0]	-0.45*			[3.4; 6.4]	4.94***			[0.87; 1.43]	1.116
School fixed effects												
School 1	0.66		[-0.4; 1.7]	0.65			[-4.7; 3.5]	-0.55			[-4.6; 3.6]	1.097
School 2	0.01		[-0.9; 0.9]	0.02			[-3.3; 2.3]	-0.57			[-3.4; 2.2]	2.195**
School 3	-0.09		[-1.0; 0.8]	-0.08			[-2.9; 2.9]	-0.02			[-2.9; 2.9]	1.675*
School 4	-0.27		[-1.5; 1.0]	-0.26			[-2.8; 4.8]	0.99			[-2.8; 4.7]	1.028
School 6	0.77		[-0.2; 1.7]	0.77			[-7.7; -0.6]	-4.19*			[-7.8; -0.6]	0.512*
School 7	1.36*		[0.3; 2.4]	1.34*			[-9.9; -2.7]	-6.23***			[-9.8; -2.6]	0.437**
School 8	1.12		[-0.1; 2.3]	1.10			[-7.5; 0.0]	-3.68			[-7.5; 0.1]	0.590
School 9	0.48		[-0.5; 1.4]	0.49			[-7.2; -0.5]	-3.88*			[-7.2; -0.6]	1.029
Constant	4.73**		[1.6; 7.8]	4.75**			[62.1; 84.6]	73.27***			[0.11; 3.25]	0.591
Observations	959			959				959				832
Number of adolescent ID	334			334				334				325

p<0.001,**
p<0.01,

* p<0.05. **Boldface** type indicates statistically significant results.

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Table 5

Mediation effect of adolescent's saving

	Beck Hopelessness Scale				Tennessee Self-Concept Scale				Adolescent's confidence in educational plans					
	Reported saving	95% CI	B coef	95% CI	Reported amount saved	95% CI	B coef	95% CI	Reported saving	95% CI	OR	95% CI	Reported amount saved	95% CI
Change in mediator from Wave 1 to Wave 2	0.19	[-0.2; 0.6]	0.01		[-0.0; 0.0]	0.21	[-1.4; 1.8]	0.00	[-0.1; 0.1]	0.93	[0.73; 1.18]	0.99		[0.97; 1.01]
Marginal intervention effect at Wave 3	-1.43***	[-2.2; -0.7]	-1.49***		[-2.2; -0.7]	2.65	[-0.1; 5.4]	2.92*	[0.2; 5.6]	2.29**	[1.29; 4.08]	2.39**		[1.35; 4.22]
Adolescent's age	0.15	[-0.0; 0.3]	0.14		[-0.0; 0.3]	-0.87**	[-1.5; -0.2]	-0.85**	[-1.5; -0.2]	1.08	[0.97; 1.19]	1.09		[0.99; 1.20]
Adolescent's gender (base: male)	-0.80**	[-1.3; -0.3]	-0.80**		[-1.3; -0.3]	1.26	[-0.4; 2.9]	1.27	[-0.3; 2.8]	1.00	[0.77; 1.30]	1.02		[0.79; 1.32]
Family cohesion	-0.40	[-0.9; 0.0]	-0.44		[-0.9; 0.0]	4.97***	[3.5; 6.5]	5.01***	[3.5; 6.5]	1.09	[0.85; 1.39]	1.09		[0.86; 1.39]
School fixed effects														
School 1	0.99	[-0.2; 2.2]	0.78		[-0.3; 1.9]	-1.31	[-5.6; 3.0]	-0.60	[-4.8; 3.6]	0.99	[0.51; 1.89]	1.08		[0.57; 2.06]
School 2	0.14	[-0.7; 1.0]	-0.03		[-0.8; 0.8]	-0.33	[-3.1; 2.4]	-0.28	[-2.9; 2.4]	1.93*	[1.14; 3.27]	2.04**		[1.21; 3.42]
School 3	0.06	[-0.8; 0.9]	-0.11		[-1.0; 0.7]	0.22	[-2.8; 3.2]	0.25	[-2.7; 3.2]	1.55	[0.94; 2.54]	1.62		[0.99; 2.63]
School 4	-0.04	[-1.3; 1.2]	-0.24		[-1.5; 1.0]	0.65	[-3.1; 4.4]	1.23	[-2.5; 5.0]	0.94	[0.58; 1.52]	0.99		[0.62; 1.59]
School 6	0.82	[-0.1; 1.7]	0.82		[-0.1; 1.7]	-4.45*	[-8.0; -0.9]	-4.14*	[-7.6; -0.7]	0.51*	[0.30; 0.87]	0.53*		[0.31; 0.90]
School 7	1.42*	[0.3; 2.6]	1.38*		[0.3; 2.5]	-6.24**	[-10.0; -2.5]	-6.36***	[-9.9; -2.8]	0.41**	[0.24; 0.70]	0.44**		[0.26; 0.74]
School 8	1.16	[-0.0; 2.3]	1.16		[-0.0; 2.3]	-3.60	[-7.3; 0.1]	-3.55	[-7.3; 0.2]	0.57	[0.32; 1.01]	0.58		[0.33; 1.02]
School 9	0.59	[-0.3; 1.5]	0.48		[-0.5; 1.4]	-4.10*	[-7.4; -0.8]	-3.96*	[-7.2; -0.7]	0.99	[0.59; 1.68]	0.99		[0.59; 1.68]
Constant	4.42**	[1.3; 7.6]	4.63**		[1.5; 7.7]	74.46***	[63.2; 85.7]	74.15***	[63.1; 85.2]	0.84	[0.15; 4.84]	0.69		[0.12; 3.86]
Observations	965		994			965		994		843		859		
Number of adolescent ID	330		346			330		346		324		337		

Boldface type indicates statistically significant results.

*** p<0.001,

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p<0.05.
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p<0.01
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