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# Psychological Factors in Adolescence and Financial Retirement Preparation at Midlife

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## Abstract

The decline in defined benefit retirement plans coupled with longer life expectancy has made personal retirement savings a crucial component of a secure retirement. The changing landscape of retirement preparation has placed increasing responsibility on individuals in a complex financial world. This study investigates how psychological factors in adolescence are related to aspects of retirement preparation that support personal retirement savings and promote long-term financial security. This paper uses the new midlife follow-up of the High School and Beyond (1980) study to examine how individuals' psychological skills and dispositions at the end of high school predict retirement preparation at midlife (age 50 in 2014). Results show that adolescent psychological factors are significantly related to four different aspects of retirement preparation at midlife, even net of midlife socioeconomic characteristics such as educational attainment and household income. The findings suggest that high school may be an effective site for policy interventions targeted at improving workers' retirement preparedness, as individuals' characteristics in high school are related to a variety of retirement preparation outcomes over thirty years later.

JEL codes: D14, D15, D91, G51, G53, I26, I28

Keywords: retirement preparation, life course, psychological factors, education

## 1. Introduction

In recent decades, workers in the United States have experienced an increasing individualization of economic risk, with risk shifting away from institutions and toward individuals (Hacker 2008). A hallmark feature of this risk shift has been the transformation of retirement preparation. Though the percentage of U.S. workers covered by retirement plans at their jobs remained relatively stable from 1989 to 2007, the percentage of workers with only defined contribution plans increased from 35% to 64% (Sabelhaus and Schrass 2009). Whereas defined benefit plans provide retirement income for all qualifying employees, defined contribution plans place the onus of saving for retirement on employees. Though many retirees can look forward to receiving Social Security retirement benefits, these benefits were not designed to be retirees' sole income source and will only replace about 40-45% of career-average earnings for the average worker (Tamborini and Purcell 2016). Without defined benefit plans from employers, households must take an active role in retirement preparation to build personal retirement savings that can supplement their Social Security retirement income sufficiently.

The midlife years are the period in which people accumulate the majority of the wealth they need to finance their retirements (Mitchell and Moore 1998). Better retirement preparation at midlife sets the stage for a secure retirement. However, 28% of adults ages 51-56 in 2004 reported that they had not thought about retirement, at all (Lusardi and Mitchell 2007). In 2013, about 45% of U.S. households age 50-59 were at risk of having insufficient retirement income (Munnell, Hou, and Webb 2014). Further, less than one-third of workers age 50 and over report that they are "very confident" they are doing a good job of preparing financially for their retirement (Williams and Young Harrison 2017).

Considering the increasing significance of personal retirement savings, it is important to understand the factors that support financial retirement preparation in the crucial midlife years. As the responsibility of preparing for retirement has shifted toward individuals, how well they navigate this financial landscape has likely become more individualized, as well. In fact, comparative research has shown that individual dispositions of workers play a much larger role in explaining variation in perceptions of retirement income adequacy in the U.S. than in the Netherlands, where almost all workers are covered by defined benefit plans (Van Dalen, Henkens, and Hershey 2010). A wealth of research has shown that individual characteristics, such as

cognitive skills and psychological dispositions, are related to financial outcomes in general and retirement preparation in the U.S., specifically (see, e.g., Hershey et al. 2007; Lusardi and Mitchell 2005; Herd, Holden, and Su 2012; Asebedo et al. 2019; Griffin, Loe, and Hesketh 2012).

Retirement preparation is a life course process, and an individual's retirement preparedness at midlife is an accumulation of a lifetime of experiences and decisions (Tamborini and Purcell 2016; Adams and Rau 2011). Thus, it is worth considering a longer view of retirement preparation by incorporating individuals' early-life characteristics that influence their financial experiences and decisions across the life course. While individuals' experiences and characteristics later in life undoubtedly shape their retirement preparation, it is also important to focus on the earlier skills and mindsets that have shaped these pathways and imbued individuals with the means necessary to plan for a secure retirement (Herd, Holden, and Su 2012; Kopusko and Hershey 2014; Tamborini and Purcell 2016; Grohmann, Kouwenberg, and Menkhoff 2015). After all, adolescents do not transition to adults as blank slates; they carry skills and dispositions with them that lead to different decision-making processes and behaviors across the life course that can have very real consequences in their adult lives. Understanding how pre-labor market psychological factors shape retirement preparation at midlife can shed light on the processes through which the characteristics adolescents carry into adulthood matter for long-term financial security.

The aim of this study is to investigate the types of early skills and dispositions that help individuals build long-run financial security through better retirement preparation. I use longitudinal data from the High School & Beyond study, which follows a nationally representative cohort of U.S. high school sophomores from about age 16 in 1980 to about age 50 in 2014. Specifically, I examine how adolescent psychological factors are associated with different aspects of retirement preparation at midlife. I focus on four measures of retirement preparation that relate to planning or savings behaviors: calculating retirement needs, having a balance-accumulating plan, the age savings commenced, and retirement account balances. By examining multiple outcomes and predictors, this research can elucidate how early psychological factors may influence retirement preparedness and how this process may vary across different aspects of retirement planning and savings behaviors.

Though researchers have often focused on contemporaneous predictors of retirement preparation, such studies miss the potential importance of the skills that individuals develop earlier in life that lead to better retirement preparedness later in life. The skills that individuals possess in

high school help shape their educational and occupational pathways, and these skills may differentially enable them to plan and manage their finances in the future. This research can enrich our knowledge of how skills in adolescence might be placing individuals on early trajectories toward (in)secure retirements. The findings in this paper can advance understanding of early-life factors and life course processes that end up shaping the importance of Social Security retirement benefits in later life. This work may inform policymakers about who is likely to be reliant on Social Security retirement benefits in future years and, thus, most sensitive to policy changes. My analysis will also point to areas where policies and programs seeking to improve financial security and retirement preparation could be incorporated early in life, especially in high schools.

## 2. Literature Review

In the face of greater personal responsibility for retirement preparation, scholars have increasingly turned to studying the individual characteristics associated with better retirement planning and savings behavior. Retirement saving decisions are complex and require consumers to possess substantial economic knowledge and information to save effectively (Lusardi and Mitchell 2007). Savings decisions do not only depend on specialized knowledge but also on individuals' cognitive skills, ability to plan over time, and perseverance to carry out long-term plans (Van Dalen, Henkens, and Hershey 2010). Indeed, individuals who engage in any kind of *planning* for retirement tend to have much more retirement wealth than individuals who do not plan (Lusardi and Mitchell 2007).

A wealth of research has underscored the role of psychological factors in explaining individual variation in retirement preparation and related financial outcomes (see, e.g., Hershey et al. 2007; Van Dalen, Henkens, and Hershey 2010; Grohmann, Kouwenberg, and Menkhoff 2015; Griffin, Loe, and Hesketh 2012; Asebedo et al. 2019; Dulebohn 2002). Many studies have focused specifically on financial literacy, which measures people's financial knowledge plus the ability to apply that knowledge in everyday life (Huston 2010). Despite evidence of the link between financial literacy and better financial decision-making (Lusardi and Mitchell 2014; 2007; Behrman et al. 2012), efforts to improve financial literacy through interventions have been largely ineffective, with any initial effects disappearing over time (Fernandes, Lynch, and Netemeyer 2014). This may be due to less portability and durability of knowledge related to specific financial

concepts. Even when financial training is effective in the short-term for a specific task, individuals are generally unable to extrapolate the underlying principles of financial education to other immediate settings (Carlin and Robinson 2012). Thus, more general psychological factors may play an important role in supporting better long-term financial behaviors because financial contexts and requirements for effective financial management are variable and change over time (Herd, Holden, and Su 2012).

A possible explanation for the importance of financial literacy in correlation studies, but not in intervention studies, is that the effect of financial literacy may be driven by individual cognitive ability (Fernandes, Lynch, and Netemeyer 2014). The link between cognitive ability and financial literacy, decision-making, and outcomes has been established in the literature (Agarwal and Mazumder 2013; Banks and Oldfield 2007; Banks, O 'Dea, and Oldfield 2010; Lusardi, Mitchell, and Curto 2010; McArdle, Smith, and Willis 2009; Herd, Holden, and Su 2012). Though broader, higher-order cognitive skills like critical thinking and problem-solving support better decision-making and outcomes across a variety of domains, more basic mathematics skills such as numeracy play a particularly important role in financial outcomes. Previous research has suggested that a substantial portion of financial literacy may be captured by measures of numeracy, as financial literacy largely depends on individuals' understanding and application of basic mathematical concepts (Skagerlund et al. 2018; Grohmann, Kouwenberg, and Menkhoff 2015; Cole, Paulson, and Shastry 2016; Jappelli and Padula 2013; McArdle, Smith, and Willis 2009). Specifically, multiple studies have shown that even early-life cognitive and mathematics skills are strongly correlated with later-life financial literacy and outcomes (Herd, Holden, and Su 2012; Jappelli and Padula 2013; Grohmann, Kouwenberg, and Menkhoff 2015).

Having the skills or knowledge to navigate financial decisions is only one piece of effective retirement preparation; people's psychological dispositions also shape their planning and savings behaviors (Asebedo et al. 2019; Griffin, Loe, and Hesketh 2012; Clark, Hammond, and Khalaf 2019). Previous research has highlighted the importance of individuals' sense of personal control in financial planning and savings decisions. Two different concepts related to personal control have received attention in the literature: self-efficacy and locus of control. Self-efficacy refers to an individual's confidence in their ability to perform well or succeed in a specific domain, whereas locus of control refers to an individual's belief about the extent to which their outcomes are dependent on their own actions. These related concepts have both been linked to greater risk

tolerance and more favorable personal financial outcomes, including better retirement preparation (Farrell, Fry, and Risse 2016; Dulebohn 2002; Skagerlund et al. 2018; Griffin, Loe, and Hesketh 2012).

People's skills and dispositions at the completion of high school may have a particularly important relationship to long-term financial outcomes because attributes at this juncture influence subsequent pathways and choices across the life course, and returns to skills increase with labor market experience (Altonji 1995; Murnane, Willett, and Levy 1995; Rosenbaum et al. 1999). For students in the United States, high school serves as the early bookend to their transition to adulthood and the highest level of compulsory education. The end of high school represents a critical period in the life course, which sets individuals on different trajectories (Schafer, Wilkinson, and Ferraro 2013). Whether students continue to postsecondary education or enter the workforce, the completion of high school is the starting point from which students will commence their future adult lives and careers. Though all students technically share the same starting point upon completion of high school, they are not similarly equipped to navigate their financial futures. Schools and families are primary sources of early financial socialization, and early financial socialization has a long-term association with financial literacy and behaviors (Grohmann, Kouwenberg, and Menkhoff 2015; Hanson and Olson 2018; Rudeloff 2019; Webley and Nyhus 2013). Early parental socialization may influence not only workers' knowledge of financial concepts, but also their attitudes toward retirement savings and orientation toward long-term planning (Webley and Nyhus 2013; Van Dalen, Henkens, and Hershey 2010).

A focus on workers' skills and dispositions at the end of high school, then, has two main benefits. First, the social sources of differences in psychological factors can be logically limited to individuals' families of origin or K-12 schooling, effectively excluding sources of variation that could later arise from adult contexts and influences in higher education, formed families, and the workplace. Second, the importance of early-life experiences for later financial knowledge and outcomes underscores the suitability of K-12 schooling as a site for policy interventions to improve financial wellbeing across the life course, as such policies can reach all U.S. students and the majority of the future workforce (Herd, Holden, and Su 2012; Jappelli and Padula 2013; Grohmann, Kouwenberg, and Menkhoff 2015).

In this paper, I use new longitudinal data to investigate the relationship between early psychological factors and later retirement preparation by focusing on two overarching research

aims. First, I investigate which skills and psychological dispositions in adolescence (~age 18) are associated with different aspects of retirement preparation at midlife (~age 50). Further, I examine the extent to which these relationships operate through adult characteristics such as educational attainment, marriage, employment, and household income, which are known to be strong predictors of retirement preparedness and security.

### **3. Data and Methods**

#### **3.1 High School and Beyond midlife follow-up**

This study uses data from the sophomore cohort of High School and Beyond (HS&B:SO). HS&B:SO is a nationally representative longitudinal survey of people who were high school sophomores in the U.S. in 1980 ( $n=14,830^1$ ), with follow-ups conducted in 1982, 1984, 1986, 1992, and 2014. For my analyses, I primarily use data from 1982, when most respondents are in their senior year of high school, and 2014, when respondents are approximately 50 years old. About 65 percent of eligible cohort members answered the 2014 follow-up ( $n=8,790$ ) (Muller et al. 2019). A subsample completed an extended version of the midlife survey ( $n=3,700$ ), which is the version that included detailed questions on retirement preparation. Thus, my sample is limited to respondents who completed the extended version.

For all descriptive and multivariable analyses, I employ appropriate HS&B:SO survey weights specific to the extended version of the midlife follow-up, which account for the sampling design and attrition to maintain a nationally representative sample (of high school sophomores in 1980). The extended version of the survey was initially intended to be administered to all respondents to the midlife follow-up; however, resource constraints necessitated that the survey be shortened during the data collection process to allow for the follow-up of more respondents. Thus, the 3,700 respondents who completed the extended version were the earliest panel members to respond to the midlife follow-up survey, making nonresponse bias an obvious concern. A nonresponse analysis in the HS&B:SO midlife follow-up technical report indicates similar patterns of nonresponse across the short and extended versions of the midlife survey: panel members from less advantaged socioeconomic backgrounds, with lower levels of academic achievement, and with

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<sup>1</sup> All sample sizes for restricted-use data are rounded to the nearest ten per NCES guidelines.



lower levels of educational attainment were less likely to participate (Muller et al. 2019). The technical report also shows that nonresponse bias was generally higher for the extended version, but nonresponse adjustments to the survey weights reduced the estimated bias by about 70 percent. This results in a modest weighted nonresponse bias of about 1.04 percentage points for the extended version—only slightly higher than the 0.5 percentage point bias from previous survey rounds that had considerably higher response rates. I also conducted ancillary analyses to verify that the subsample-specific survey weights correct for any nonresponse bias related to the specific independent variables used in my analyses.

### **3.2 Independent variables**

Table 1 presents weighted means and proportions for sociodemographic characteristics of my sample in adolescence and midlife, which are used as covariates in my analyses. I imputed any missing values on independent variables using multiple imputation with chained equations ( $m=20$ ). Adolescent characteristics are measured during respondents' senior year of high school (1982), and midlife characteristics are measured at about age 50 (2014). Bachelor's degree completion (for respondents and parents) includes all degrees above a Bachelor's, and respondents were considered as having a parent with a Bachelor's degree if at least one of their parents had a Bachelor's degree. Individuals are considered as working if they indicated "currently working" as their employment status at the time of the midlife survey, which includes part-time workers. Household income at midlife is the reported total income for all adults contributing to the household, in continuous dollars; for most respondents, this includes the respondent and a spouse/partner if applicable. Parental income is based on panel members' household income while in high school; respondents reported their household income in bins during their sophomore (1980) and senior (1982) years. I assigned incomes to bin midpoints to create continuous measures and averaged the 1980 and 1982 measures if both were available; otherwise, I used whichever year was available. One limitation of the parental income measure is that a relatively large proportion of respondents reported the highest income bin, which has an undefined upper bound. Thus, the assigned pseudo-midpoint for that bin likely leads to an artificially compressed distribution and lowered mean for parental income. For comparison, the average parental income in my sample is \$21,480 (~\$67,500 today), whereas the national mean household income for households headed by individuals ages 35–44 (which would include most parents of panel members) was \$26,000–\$29,000 (~\$78,000–\$82,000 today) in 1980–82 (US Census Bureau 2019).

Table 1. Weighted means and proportions for covariates

	Mean/Proportion	SD
Female	0.51	
Race/Ethnicity		
White	0.73	
Black	0.12	
Hispanic	0.12	
Other	0.03	
<i>Midlife characteristics</i>		
Completed Bachelor's degree	0.39	
Married	0.66	
Working	0.80	
Household income	109,928	81,273
<i>Adolescent characteristics</i>		
Parent had Bachelor's degree	0.31	
Parental income (1982 dollars)	21,480	12,421
High school urbanicity		
Suburban	0.47	
Rural	0.30	
Urban	0.23	
Private high school	0.09	

n = 3,700

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Study (HS&B) Restricted-use Data File.

The focus of this paper is to investigate relationships between adolescent psychological factors and midlife retirement preparation outcomes. I examine a variety of measures related to individuals' skills and psychological dispositions in their senior year of high school, which are detailed in Table 2. All standardized variables were standardized using the full 1982 HS&B:SO panel to a mean of 0 and standard deviation of 1, which accounts for the slight variation in the means/SDs for the midlife analytic subsample. All three achievement test scores were scaled by HS&B according to Item Response Theory (IRT). The math test items are a mix of questions that measure general cognitive math abilities and questions that correspond to the content of high school curriculum, covering basic arithmetic, fractions, and some algebra and geometry (Coleman, Hoffer, and Kilgore 1982; Heyns and Hilton 1982; Rock et al. 1985). Grade point average is respondents' weighted core academic GPA, which includes only core academic courses, gives

greater weight to honors and AP/IB courses, and is measured on a 4-point scale. Locus of control is a scale based on a series of questions that indicates a respondent's sense of personal control (Rotter 1966); people with a more internal locus of control (higher on scale) believe they have more control over what happens to them in their lives. Work and family orientation are composite scales that assess the level of importance respondents place on goals/values related to work or family (such as living close to family, making a lot of money, etc.). Academic self-efficacy is a Likert-type scale that indicates how confident respondents are in their ability to complete college, regardless of whether they planned to attend – with responses ranging from “definitely could not” to “yes, definitely could” complete college. The final measure is an indicator of financial decision-making, which is one of the only items available related to financial preferences/behavior in high school. The question asked all respondents what they would do, hypothetically, if the college they wanted to attend cost \$1,500 more than they could afford (~\$5,000 today).

Table 2. Weighted means and proportions for adolescent characteristics

	Mean/Proportion	SD
<b><i>Academic-related skills</i></b>		
Mathematics test score (std)	0.07	0.99
Vocabulary test score (std)	0.07	0.97
Reading test score (std)	0.06	0.99
GPA	2.34	0.76
<b><i>Psychological dispositions</i></b>		
Locus of control (std)	0.04	0.95
Work orientation (std)	-0.03	1.05
Family orientation (std)	-0.07	0.99
Academic self-efficacy	2.98	1.04
<b><i>Financial decision-making</i></b>		
If \$1,500 needed for college		
Get a loan	0.27	
Get parttime job	0.32	
Attend less costly college	0.12	
Wait for funds	0.06	
Don't know	0.25	

n = 3,700

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Study (HS&B) Restricted-use Data File.

### 3.3 Retirement preparation outcomes

I focus on four outcomes that relate to different aspects of retirement preparation. The weighted means and proportions of the outcomes are presented in Table 3, for the full sample and key demographic subgroups. The first outcome is whether a respondent has ever tried to figure out how much savings they need for retirement. Overall, about 56 percent of the sample report they have tried to figure out how much they need to save. Previous studies have found that 46% of U.S. workers (Helman, Greenwald, and VanDerhei 2010) and 61% of older (>40) employees at a large university (Mayer, Zick, and Marsden 2011) had tried to calculate savings needed for retirement. Thus, the proportion of respondents in this sample falls squarely between these prior estimates. Calculation of retirement needs varies among respondents by education; over 70 percent of respondents with bachelor's degrees have tried to figure the savings needed compared to less than 50 percent of respondents without bachelor's degrees.

The second outcome is whether respondents report having at least one balance-accumulating retirement plan (IRA, 401(k), etc.). This could be their only plan or may be in addition to a non-accumulating plan; it is impossible to distinguish between these contexts in the data. This outcome is not measuring whether respondents have *any* retirement plans; if they only have a non-accumulating plan, they would not be captured by this question. I focus specifically on balance-accumulating plans mainly because most individuals must choose to participate in these plans, whether privately or through an employer offering. Therefore, the propensity to have these types of plans is likely to be more associated with psychological characteristics. The decision to participate in a plan is a relatively simple action, but it represents perhaps the most foundational step toward building personal retirement savings. Further, most people in the U.S. do not have access to defined benefit plans, so this captures the most common retirement savings vehicle. The individuals in my sample are at prime ages for accumulating personal retirement savings, and 68 percent report having a balance-accumulating plan, underscoring the ubiquity of individual responsibility for retirement preparation in the U.S. today. This figure is comparable to findings from a prior study on older adults (mid-60s), in which about 75% reported that they or their spouse had a balance-accumulating plan (Herd, Holden, and Su 2012). Again, this planning measure exhibits a major educational divide: over 80 percent of respondents with bachelor's degrees report

having a plan, compared to less than 60 percent of less-educated respondents. Men with bachelor's degrees are particularly likely to have a balance-accumulating plan, at almost 90 percent.

The third outcome is the age respondents started saving for retirement. This question was only asked of individuals who reported they were currently saving for retirement. On average, respondents started saving for retirement around age 30, with individuals with bachelor's degrees starting to save about two years earlier than those without bachelor's degrees. This is interesting because, on its face, delayed labor force entry would suggest that bachelor's degree holders might start saving later. The observed opposite pattern may speak to privileges afforded by a bachelor's degree, as people without a degree enter the labor force earlier but at lower paying jobs that likely provide less robust benefits. However, another factor underlying this pattern is that educational attainment is correlated with skills and dispositions that lead individuals to save earlier.

Table 3. Weighted means and proportions for retirement preparation outcomes, by key demographic subgroups

	Ever tried to figure out savings needed	Has balance- accumulating plan	Age started saving for retirement <sup>a</sup>	SD	Balance of retirement accounts <sup>b</sup>	SD
Full sample	0.56	0.68	30.15	8.01	156,725	180,642
Women	0.55	0.67	30.78	8.53	107,528	139,920
Men	0.57	0.69	29.53	7.78	203,883	203,454
Bachelor's degree	0.72	0.83	29.06	8.05	200,413	232,152
Women	0.70	0.78	29.59	8.38	141,200	181,250
Men	0.75	0.88	28.48	7.68	258,923	249,457
No Bachelor's degree	0.46	0.58	31.12	7.71	117,592	133,635
Women	0.44	0.58	31.91	8.26	76,466	93,517
Men	0.48	0.58	30.39	7.57	155,953	158,431
n =	3,380	3,360	2,490		1,960	

<sup>a</sup> Only respondents who reported they were currently saving for retirement were eligible for this question

<sup>b</sup> Only respondents who reported a balance-accumulating plan were eligible for this question

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Study (HS&B) Restricted-use Data File.

The final outcome is the balance of respondents' balance-accumulating retirement accounts, which was only asked of respondents who reported a balance-accumulating plan. Eligible respondents who refused to report (9 percent) or did not know the balance (10 percent) are counted as missing. Among the four outcomes, the balance of respondents' retirement accounts is arguably the best assessment of the *level* of respondents' financial retirement preparation. Though the average respondent with a balance-accumulating account reports a balance of around \$157,000, this varies widely by gender and educational attainment. Individuals with bachelor's degrees have higher account balances (\$200,000) than those without degrees (\$118,000); this is on top of the fact that people with bachelor's degrees are also more likely to have a plan. Further, men report significantly higher balances than women, regardless of education. In robustness checks, I repeated this study's analyses using the natural log of account balances, and results are largely identical to using the continuous dollar amount; however, the continuous dollar amount had a better model fit.

I investigate the relationship between adolescent skills/attitudes and midlife retirement preparation with a series of ordinary least squares (OLS) regressions for continuous outcomes and logistic regressions for dichotomous outcomes. I estimate separate regressions for each psychological measure to provide an assessment of the long-term relationship between each predictor and outcome pair. Estimating separate regressions for each predictor avoids issues of multicollinearity among sets of predictors that limit the ability to assess independent contributions, especially for logistic outcomes. These analyses are intended to provide a broader overview of the relationships between a variety of adolescent psychological factors and midlife retirement preparation outcomes, and the extent to which these associations exist through or independently of adult attainments. Results for dichotomous outcomes are reported as average marginal effects (AMEs) to enable comparisons of coefficients across models. The AMEs can be interpreted as the average percentage point change in predicted probabilities.

I estimate two nested models for each predictor-outcome pair. The first model controls for sex, race/ethnicity, and adolescent characteristics listed in Table 1 to account for the contemporaneous correlation between psychological factors and sociodemographic characteristics in high school. The second model adds midlife characteristics from Table 1 as possible mediators for the relationship between the predictor and outcome. Thus, the final model estimates the independent relationship between the predictor and outcome, net of adolescent and adult

sociodemographic characteristics. All analyses include appropriate survey weights and clustered standard errors at the high school level (using the *svy* command in Stata).

## 4. Results

The results from the regression analyses for all outcomes are presented in Tables 4 and 5. Because I estimated separate regressions for each predictor-outcome pair, each cell (or series of cells for a categorical predictor) contains a coefficient or AME from a separate regression model that includes the specified predictor and corresponding model covariates. None of the separate regressions include any of the other predictors listed in the table. Though this estimation approach does not exclude the possibility that some of the observed relationships may be due to correlations with other predictors, I still discuss the implications or possible explanations for the various predictors and patterns of predictors.

Table 4 presents results from separate regressions for all predictor-outcome pairs for the first model, which includes only adolescent covariates. These estimates assess the *overall* long-term relationship between the adolescent psychological characteristics and midlife retirement preparation. I expect that these associations operate at least partially through adult attainments, especially considering that all outcomes were highly stratified by educational attainment. Thus, I will highlight basic patterns but focus more on the results net of adult covariates in Table 5. Net of demographic, adolescent SES, and school covariates, most of the psychological predictors show significant relationships to each of the retirement preparation outcomes. Each predictor is significantly associated with at least one of the outcomes. The least consistent predictors appear to be family orientation and financial decision-making, though individuals who gave a response of “don’t know” on the financial decision-making measure have poorer retirement preparation across all outcomes. Though reporting model fit statistics for the 36 separate regressions would be unwieldy, the explanatory power of the adolescent measures is relatively modest and varies across predictor-outcome pairs. The proportion of variance explained is about: 3–8% for calculation of savings needs, 5–11% for plan participation, 3–5% for age started saving, and 11–16% for retirement account balances. Considering the time gap of over 30 years between measurement of the independent and dependent variables, it is perhaps not surprising that adolescent characteristics (and basic demographics) explain a relatively small amount of the variance in retirement

preparation outcomes. The fact that the models explain the largest proportion of variance for retirement account balances suggests that early factors may have a weak association with any one discrete behavior or decision across the life course, but have a stronger association with long-term outcomes that are products of the accumulation of decisions and behaviors over time.

Table 4. Associations between adolescent characteristics and midlife retirement preparation: estimates from separate regression models for each predictor

	Ever tried to figure out savings needed <sup>a</sup>		Has balance- accumulating plan <sup>a</sup>		Age started saving for retirement <sup>a</sup>		Balance of retirement accounts <sup>a</sup>	
	AME <sup>b</sup>		AME <sup>b</sup>		Coefficient <sup>c</sup>		Coefficient <sup>c</sup>	
<b><i>Academic-related skills</i></b>								
Mathematics test (std)	0.12	***	0.13	***	-1.00	***	43,089	***
Vocabulary test (std)	0.10	***	0.10	***	-0.37		25,558	***
Reading test (std)	0.11	***	0.10	***	-0.52	**	24,363	***
GPA	0.13	***	0.14	***	-1.70	***	47,162	***
<b><i>Psychological dispositions</i></b>								
Locus of control (std)	0.09	***	0.07	***	-0.49	**	16,535	***
Work orientation (std)	0.04	***	0.02	*	-0.62	**	14,595	***
Family orientation (std)	0.02	*	0.01		-0.47	**	-835	
Academic self-efficacy	0.07	***	0.06	***	-0.42		31,570	***
<b><i>Financial decision-making</i></b>								
If \$1500 needed for college (ref: Get loan)								
Get parttime job	0.01		-0.01		0.85		-33,189	**
Attend less costly college	0.02		-0.04		0.45		-34,170	**
Wait for funds	-0.03		-0.02		2.37	**	-13,870	
Don't know	-0.11	***	-0.07	*	1.80	**	-53,075	***

\*p<.05, \*\*p<.01, \*\*\*p<.001

Note: Each cell (or series of cells for a categorical predictor) contains a coefficient from a separate regression model that includes the specified predictor and model covariates. None of the separate regression models include the other predictors listed in the table.

<sup>a</sup> Models include controls measured during respondents' senior year of high school: race/ethnicity, sex, parental income, parental education, school urbanicity, school sector

<sup>b</sup> Average marginal effects from logistic regressions

<sup>c</sup> Coefficients from OLS regressions

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Study (HS&B) Restricted-use Data File.



Table 5 presents results from separate regressions for all predictor-outcome pairs for the second model, which adds midlife covariates as potential mediators of the relationships between the psychological predictors and retirement preparation outcomes. Accounting for midlife covariates attenuates the coefficients/AMEs from Table 4 markedly, implying that much of the relationship between adolescent psychological factors and midlife retirement preparation operates through educational attainment, employment, marriage, and household income. However, many of the adolescent predictors remain significantly associated to retirement preparation even net of these strong midlife covariates. The results indicate an obvious distinction between the first two and last two outcomes, in terms of the patterns across adolescent psychological predictors. Calculating savings needs and having a personal retirement plan both relate more to retirement *planning*, whereas the age people started saving and the balance of their accounts have more to do with retirement *savings*. Thus, it appears that some psychological factors are associated with either planning or savings behaviors, and some are associated with both aspects of retirement preparation. This distinction aligns with prior work by Lusardi and Mitchell (2005), who found that financial knowledge was associated with calculating retirement needs but not with the actions people took based on their calculations.

Beginning with the “planning” outcomes, the results indicate nearly identical patterns among the predictors for calculating savings and having a balance-accumulating plan. The fact that skills in all academic subjects, in addition to GPA, show similar relationships to the outcomes may suggest that more general, higher-order cognitive skills are related to individuals’ propensities to engage in retirement planning behaviors. A one standard deviation increase in test scores in any of the academic subjects is associated with a .04–.06 greater predicted probability of engaging in either planning behavior by midlife. Further, locus of control and academic self-efficacy show an association with both planning outcomes; respondents who perceived a greater sense of control over their lives or confidence in their academic abilities in high school are more likely to engage in retirement planning behaviors as adults. The only slight difference between the two planning outcomes is that work orientation is significantly associated with calculating savings needs but not with having a plan, though this difference is not statistically significant and point estimates are similar. Individuals with a greater orientation toward work may be more likely to think about their

future work trajectory and eventual labor force exit, prompting them to engage in retirement planning behaviors.

Table 5. Accounting for potential mediators in the associations between adolescent characteristics and midlife retirement preparation: estimates from separate regression models for each predictor

	Ever tried to figure out savings needed <sup>a</sup>	Has balance- accumulating plan <sup>a</sup>	Age started saving for retirement <sup>a</sup>	Balance of retirement accounts <sup>a</sup>
	AME <sup>b</sup>	AME <sup>b</sup>	Coefficient <sup>c</sup>	Coefficient <sup>c</sup>
<b><i>Academic-related skills</i></b>				
Mathematics test score (std)	0.05 ***	0.06 ***	-0.60 *	17,156 ***
Vocabulary test score (std)	0.04 **	0.04 ***	0.16	-664
Reading test score (std)	0.05 ***	0.04 ***	-0.14	2,791
GPA	0.04 **	0.05 ***	-1.36 ***	19,573 ***
<b><i>Psychological dispositions</i></b>				
Locus of control (std)	0.05 ***	0.03 **	-0.21	1,428
Work orientation (std)	0.03 ***	0.02	-0.56 **	8,542 **
Family orientation (std)	0.01	0.00	-0.41 *	-3,922
Academic self-efficacy	0.03 *	0.02 *	-0.02	12,591 **
<b><i>Financial decision-making</i></b>				
If \$1500 needed for college (ref: Get loan)				
Get parttime job	0.04	0.01	0.59	-14,049
Attend less costly college	0.04	-0.04	0.10	-21,905
Wait for funds	0.01	0.01	1.98 **	-4,870
Don't know	-0.04	0.01	1.34 *	-25,151 **

\*p<.05, \*\*p<.01, \*\*\*p<.001

Note: Each cell (or series of cells for a categorical predictor) contains a coefficient from a separate regression model that includes the specified predictor and model covariates. None of the separate regression models include the other predictors listed in the table.

<sup>a</sup> Models include controls measured at midlife: educational attainment, employment status, household income, and marital status; and the following controls measured during respondents' senior year of high school: race/ethnicity, sex, parental income, parental education, school urbanicity, school sector

<sup>b</sup> Average marginal effects from logistic regressions

<sup>c</sup> Coefficients from OLS regressions

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Study (HS&B) Restricted-use Data File.

Turning to the “savings” outcomes, the results again show similar patterns among the predictors for the age when people started saving and the balance of their accounts. In general, people who started saving earlier should accumulate more savings, so it is intuitive that similar cognitive processes may underlie these outcomes. In contrast to the planning outcomes, mathematics is the only academic subject that shows significant associations with the savings outcomes. The particularly strong relationship between math test scores and account balances is in line with a wealth of previous research showing an independent relationship between early math skills and later economic outcomes. Individuals who scored one standard deviation higher on the math achievement test in high school have about \$17,000 higher account balances, even net of their household income. Another distinction between the planning and savings outcomes is that the early measure of financial decision-making is significantly related to savings behaviors but not planning behaviors. Individuals who responded “don’t know” to the financial decision-making measure started saving later and have lower account balances compared to people who indicated they would get a loan. Though this is an unusual measure of financial decision-making, it may be tapping early financial literacy, which I cannot measure in this data. Adolescents who indicated they would get a loan may have had relatively high financial literacy, whereas adolescents who did not know what they would do may have had particularly low financial literacy (see Lusardi and Tufano 2009). Because the models control for respondents’ SES and parental education in high school and their own educational attainment, it is less likely that this pattern is due to respondents’ actual ability to afford or propensity to attend college. It is also possible that a “don’t know” response may not indicate a lack of financial literacy but rather greater indecisiveness more generally.

Differences between the two savings outcomes indicate that the factors associated with an inclination or ability to save earlier are not necessarily the same as those associated with higher account balances. This may relate to the dual processes underlying the age people start saving for retirement. On the one hand, people with higher incomes earlier in life can generally afford to start saving for retirement earlier because they have excess earnings to put toward savings. On the other hand, people may delay saving for retirement due to additional schooling or steeper earnings trajectories but still have higher account balances than earlier savers with fewer years of schooling or flatter earnings trajectories. Comparing the two savings outcomes, a main difference is that the response of “wait for funds” on the financial decision-making measure is significantly

related to the age people started saving, whereas this response is not associated with account balances. On average, people who said they would “wait for funds” started saving for retirement two years later than people who said they would get a loan, which implies that this response may indicate a less proactive disposition in general or toward finances specifically. Other differences between the two savings outcomes are that self-efficacy is only associated with account balances whereas family orientation is only associated with the age people started saving. In fact, family orientation is uniquely associated with the age people started saving and none of the other retirement preparation outcomes, though it is somewhat difficult to interpret this association. One possibility is that people with a greater orientation toward family may have formed partnerships earlier in life, which could have allowed earlier retirement savings if it lowered their per capita expenses; previous research has also shown that cohabitating and married individuals tend to have longer financial planning horizons (Fulda and Lersch 2018).

Only two of the adolescent predictors are significantly related to all four retirement preparation outcomes: math test score and GPA. The importance of math skills for retirement preparation has been underscored in recent studies, and these results suggest that math skills play a ubiquitous part in retirement planning and savings behaviors. Because GPA is a measure of academic-related skills and knowledge *and* more general dispositions such as effort and self-discipline, the combination of these types of cognitive resources may be particularly salient in relation to people’s financial planning and savings behaviors. The other measures that show a significant relationship to at least one outcome related to both planning and savings are work orientation and self-efficacy. The importance of these measures may be due to their correlation with the academic-related skills measures, especially because the self-efficacy measure specifically relates to academic abilities. It is also possible that motivation for and salience of retirement preparation may be greater among individuals with a stronger orientation toward work. As with Table 4, I do not report the model fit statistics for the 36 separate regressions; including the midlife covariates in Table 5 increases the explanatory power of the models, though it still varies across predictor-outcome pairs. The amount of variation explained ranges from: 13–14% for calculation of savings needs, 21–22% for plan participation, 6–7% for age started saving, and 31–32% for retirement account balances. The low proportion of variance explained for the age people started saving highlights the complicated processes underlying this outcome and is likely partially because the *timing* of savings decisions may be more dependent on individuals’ situations at particular points in time.

## 5. Conclusion and Discussion

The increasing importance of personal retirement savings places a great deal of responsibility on individuals in a complex financial landscape. This paper has shown that adolescent psychological factors are significantly related to retirement preparation at midlife, over thirty years later. These relationships partially operate through adult attainments, but independent relationships persist after accounting for midlife socioeconomic characteristics. Though at least some measures of adolescent academic-related skills and psychological dispositions are significantly related to all four outcomes, the types of skills or dispositions that have long-term associations with retirement preparation vary across different aspects of planning and savings behavior.

Math skills and academic achievement are the only predictors that show a consistent, significant long-term relationship to all four aspects of retirement preparation: calculating retirement needs, having a balance-accumulating plan, the age people start saving, and the balance of retirement accounts. However, the specific psychological factors associated with retirement preparation outcomes related to *planning* behaviors are slightly different than those associated with outcomes related to *savings* behaviors. The distinction suggests that more general or higher-order cognitive skills and a greater sense of personal control may be more associated with planning behaviors, whereas early approaches to financial decision-making are uniquely associated with later savings behaviors.

This study adds to previous literature on the long-term relationship between adolescent characteristics and adult economic outcomes by showing that individuals' skills and dispositions in high school are associated with multiple aspects of retirement preparation at midlife (~age 50), even net of midlife educational attainment, household income, marriage, and employment. The independent relationships between the adolescent predictors and retirement preparation outcomes underscore high school as a site for policy intervention in preparing workers for secure retirements. Though full retirement age now comes almost fifty years after students finish high school, retirement preparation begins early in workers' careers; individuals in the current study began saving for retirement at an average age of thirty years old. Individuals' psychological characteristics at the end of high school influence their retirement planning and savings behavior across the life course, culminating in significant inequalities in retirement preparedness at midlife. Surveys that focus on retirement preparation often reach respondents later in life, which makes it

impossible to identify the foundational skills and dispositions that set individuals on different financial trajectories toward retirement. By using longitudinal data that followed individuals from age 16 to age 50, this paper provides an overview of the pre-labor market predictors of retirement preparation and the processes underlying the long-term associations.

Spurred by an increasingly complex financial landscape and rising student loan debt, improving students' financial decision-making skills has become a focal issue in recent secondary education policies. My results suggest that a focus on increasing math skills and general academic achievement may yield the most substantial long-term benefits for students' future retirement preparedness, as they are the only adolescent predictors that show strong and consistent associations with all planning and savings outcomes. Importantly, the math skills measure in this study is based on a test that included items mostly related to general cognitive math abilities, basic arithmetic, and fractions—with no questions on math concepts above the level of geometry. This underscores the importance of strong foundational math skills for long-term financial outcomes. Though these foundational skills are developed in elementary and middle school, they can be continually monitored and reinforced in high school as students progress through more advanced math coursework to ensure mastery.

Further, the importance of early psychological characteristics suggests that educational policies and programs focused specifically on financial management may be more effective if they are tailored to students' skills and dispositions (Griffin, Loe, and Hesketh 2012; Hershey and Mowen 2000). Understanding which skills and dispositions are associated with long-term financial outcomes can help educators develop individualized plans to address students' unique strengths and risk factors. For instance, students with stronger math skills may feel comfortable engaging in complex financial calculations, whereas students with weaker math skills may feel overwhelmed by calculations and could benefit more from general rules of thumb for financial behaviors (Binswanger and Carman 2012). Individualized education plans obviously require more investment from schools and teachers; therefore, another option may be a less individualized but more diversified financial education curriculum that focuses on reinforcing a variety of beneficial skills and dispositions in addition to specific financial knowledge. Because financial preparation for retirement is a life course process, research on early factors that support long-term retirement planning and savings can help schools provide an early foundation for secure retirements.

A main limitation of this study is that I cannot claim the associations between adolescent psychological factors and midlife retirement preparation are causal. However, the longitudinal nature of the data provides reliable, contemporaneous measures of early psychological characteristics and at least establishes the direction of any causal relationship between the predictors and retirement preparation outcomes. Though I found that a variety of academic-related skills and psychological dispositions in adolescence were associated with better retirement preparation later in life, correlations between psychological measures make it difficult to disentangle these relationships. Because the analyses in this paper did not estimate models with combinations of predictors, I cannot isolate the unique contributions of each psychological measure. Though the measures are correlated, they vary in terms of malleability and are sensitive to different mechanisms. Thus, a future direction of this work will focus on disentangling independent effects or interactions between these factors to better understand how these various early skills and dispositions serve as long-term resources in retirement preparation. Considering that previous research suggests early skills are more strongly associated with later financial outcomes for people without college degrees (Herd, Holden, and Su 2012), next steps will also include assessing whether these relationships vary by educational attainment.

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