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Do good things come in pairs? How personality traits help explain individuals' simultaneous pursuit of a healthy lifestyle and financially responsible behavior

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Abstract

Both a healthy lifestyle and financially responsible behavior contribute to individual wellbeing and benefit society. Motivated by the fact that both types of behavior involve short-term sacrifices in exchange for uncertain long-term benefits and require self-control, we examine individuals' consistency in behavior across the health and financial domains. Using a large-scale data set of 3,752 employed Australians, we find that the majority of individuals behave in a consistently beneficial or detrimental way across both domains. This behavioral consistency relates to fundamental life outcomes, including physical and mental health, financial prosperity, and life satisfaction. In a new contribution to the literature, we show how personality traits—Locus of Control, the Big Five, Achievement Motivation—have a meaningful role in explaining the simultaneous pursuit of a healthy lifestyle and financially responsible behavior. These behavioral insights can guide policymakers in developing more effective strategies to steer individuals towards beneficial health and financial outcomes.

Arvid O. I. Hoffmann and Leonora Risse contributed equally to this article.

KEYWORDS

health behavior, household finance, personality traits

1 | INTRODUCTION

Practicing a healthy lifestyle (such as exercising, eating healthily, and avoiding smoking) and engaging in financially responsible behavior (such as paying bills on time, saving regularly, and avoiding gambling) are fundamental to individual wellbeing. In addition to providing benefits to the individual, in terms of enhancing their quality of life, these individual behaviors also deliver significant benefits to the wider community and governments. These wider societal benefits include avoiding losses in national productivity, as well as minimizing the direct costs placed on the public welfare system associated with ill health, financial insecurity, or impoverishment.

Accordingly, governments and community organizations invest heavily in trying to incentivize individuals to engage in behaviors that are conducive to favorable health and financial wellbeing outcomes. Examples include online tools to assist with personal financial management, public health campaigns promoting healthy eating and regular exercise, guidelines on alcohol consumption, and campaigns imploring individuals to “quit smoking” or “gamble responsibly.”¹ Despite the positive intentions of these campaigns, many individuals still engage in a range of detrimental behaviors, cutting short their quality of life and placing a cost burden on society (Cobb-Clark *et al.*, 2014). Indeed, the facts that nearly two-thirds of Australian adults are overweight or obese (AIHW, 2017), one in four regularly exceed safe alcohol consumption quantities (AIHW, 2016), only one in twenty eat the recommended intake of fruits and vegetables (AIHW, 2018), one in twelve experience a gambling problem (AIFS, 2017), and more than one in ten struggle to pay utility bills on time (Wilkins and Lass, 2018), suggests there is scope to improve the design of these interventions to be more effective. Specifically, during the planning and implementation of intervention strategies, the provision of factual information needs to be complemented by design elements that accommodate the behavioral disposition of the individuals expected to act upon this information. In this regard, recent work emphasizes the importance of taking into account psychological factors to better understand individuals' financial behavior (Hoffmann and McNair, 2019).

In this study, we address these policy challenges and take a unique approach to identifying and understanding the possible factors that influence an individual's health and financial management behaviors. We consider whether particular personality traits underscore an individual's intrinsic predisposition to pursue beneficial behaviors and, equally, to refrain from detrimental behaviors. Importantly, we do not restrict our analysis to a single domain of behavior. Rather, we investigate the potential for the influence of an individual's personality to transcend across multiple domains of an individual's life and correlate to their likelihood to simultaneously pursue beneficial health and financial behaviors. While we cannot claim causality, the detection of any link between an individual's personality traits and their capacity to engage consistently in beneficial health and financial management behaviors is relevant for policymakers, because it could help identify the underlying personality aspects that need to be considered when designing and implementing policy interventions to steer people's behavior into more beneficial directions.

There is reason to expect consistency in an individual's behaviors across the health and financial domains, as both domains evoke a similar decision-making context (Finke and

Huston, 2013). That is, pursuing beneficial behaviors often requires an individual to make short-term sacrifices in exchange for uncertain long-term benefits. For example, exercising regularly may mean giving up alternative, possibly more enjoyable, uses of one's time, while eating healthily requires giving up food that one might consider tastier and would prefer to enjoy. Furthermore, it can take time to reap the associated benefits and see one's physical condition improve, such as noticing a reduction in body weight, while other benefits such as a reduced risk of diabetes or heart disease may not be immediately discernible at all. In a similar manner, saving regularly and investing for retirement means trading off current consumption for a higher, but uncertain, future consumption. Accordingly, the barriers to engaging in a healthy lifestyle may be similar to those that may also impede engaging in financially responsible behavior, in the sense that both a healthy lifestyle and financially responsible behavior require individuals to demonstrate patience and exercise self-control (Hagger *et al.*, 2010; Finke and Huston, 2013), and individuals may perceive the required short-term sacrifices as prohibitively expensive, painful, or challenging (Carpenter, 2010).

Whether or not we observe consistency across an individual's health and financial behaviors is also informed by theories on the nature of self-control. We may expect simultaneity in the pursuit of beneficial behaviors across both domains if we conceptualize self-control as a "muscle" that is being trained by its continued use. Based on this "reinforcement" view of self-control (Muraven *et al.*, 1999), we might expect consistency in an individual's pursuit of beneficial behaviors across the two different domains. For example, exercising regularly and refraining from junk food may strengthen an individual's self-control, leading them to also demonstrate discipline in paying their bills on time and refraining from gambling. Indeed, there is emerging evidence for such generalizable benefits of self-control (see Wang *et al.*, 2017). However, such work has used laboratory games instead of actual outcomes across different decision contexts and failed to identify the explanatory role of differences in personality traits due to utilizing a non-representative student sample (Wang *et al.*, 2017, 1,303). On the other hand, should we observe inconsistency in an individual's behavior across domains—beneficial behavior in the one domain, yet detrimental behavior in the other—this may be explained by the notion that self-control is a "scarce resource" that is being depleted by its use. Based on this "ego-depletion" view of self-control (Baumeister *et al.*, 1998), we might expect a trade-off across the two domains of behavior. For example, individuals who are making a concerted effort to ascribe to a healthy diet and exercise regime may experience a depletion in their overall "reservoir" of self-control, leading them to succumb to financially irresponsible behavior, such as overspending on discretionary items, thus failing to save or pay off their credit card on time. Hence, the relationship between a healthy lifestyle and financially responsible behavior may go in either direction.

Motivated by research showing how motivation and emotion regulation can override the effects of ego-depletion (Muraven *et al.*, 1999; Muraven and Slessareva, 2003), we examine the extent to which individuals demonstrate consistently healthy and financially responsible behavior across multiple domains in their life as a function of their intrinsic personality traits. Our investigation is guided by the following three research questions. First, to what extent do individuals display simultaneity in their pursuit of beneficial behaviors across both domains? Second, how does the extent of simultaneity in individuals' health and financial management behaviors correlate with fundamental life outcomes, including physical and mental health, life satisfaction, and subjective prosperity? Third, how might the degree of simultaneity between individuals' health and financial management behaviors be explained by their personality traits?

In answering our research questions, we unite and extend three streams of research at the intersection of economics, finance, and consumer studies that remain largely unconnected to date. First, we build on studies examining the relation between personality traits and financial behavior, which focus on the role of Locus of Control (LOC), the Big Five personality traits, and Achievement Motivation. Specifically, Tokunaga (1993), Davies and Lea (1995), and Perry and Morris (2005) find that an external LOC is negatively related to responsible financial management behavior, while Kidwell *et al.* (2003) and Cobb-Clark *et al.* (2016) find that an internal LOC is positively related to responsible financial management behavior. In terms of the Big Five, Nyhus and Webley (2001), Brown and Brown and Taylor (2014), Mosca and McCrory (2016), Gerhard *et al.* (2018), and Asebedo *et al.* (2019) find a positive association between both conscientiousness and emotional stability and savings behavior. Finally, regarding Achievement Motivation, Zhou and Pham (2004) show how an approach orientation centered around hope for success helps explain individuals' decisions to trade individual stocks, while Millet *et al.* (2012) show how an avoidance orientation centered around fear of failure helps explain decisions to take out (health) insurance.

Second, we augment the limited body of work investigating the relation between aforementioned personality traits and health behavior. Cobb-Clark *et al.* (2014) find that an internal LOC is positively related to engaging in a healthy diet and regular exercise, while in terms of the Big Five, Booth-Kewley and Vickers (1994) find that less emotionally stable or conscientious individuals are less likely to exercise and eat healthy. Finally, Mann *et al.* (2013) suggest that an approach orientation is more conducive for a healthy lifestyle than an avoidance orientation.

Third, we expand the emerging literature on the overlap between financial and health behaviors. In this regard, one set of studies reveals a positive correlation between responsible financial behaviors and responsible health behaviors. For example, O'Neill *et al.* (2016) show that individuals reporting more positive financial management practices also report more positive health management practices. Finke and Huston (2013) show that intertemporal health behaviors are related to the intention to save for retirement. Finally, Puri and Robinson (2007) show that individuals' optimism is related both to their financial decisions and the decision to smoke or not. Another set of studies examines the role of individuals' health status as a background risk in portfolio choice (Rosen and Wu, 2004; Berkowitz and Qiu, 2006; Fan and Zhao, 2009; Atella *et al.*, 2012; Yogo, 2016).

We contribute to the existing literature by extending and bringing together these three streams of research on (a) the relation between personality traits and financial behavior, (b) the relation between personality traits and health behavior, and (c) the overlap between financial and health behaviors. In particular, we are the first to combine and simultaneously investigate all three elements. That is, the extant literature does not examine the role of individuals' personality traits in explaining the link between both leading a healthy lifestyle and displaying financially responsible behavior, while we also include more distinct components of individuals' personality into a single study. Importantly, while previous work has examined how individuals' personality traits are related to *either* their health or financial behavior, it has not examined how these traits are related to trade-offs or consistency in individuals' behavior *across* these two different decision-making domains.

Increasing our understanding of these aspects of individuals' daily life is important, as both a healthy lifestyle and financially responsible behavior have clear policy relevance given (a) the worldwide obesity epidemic and the associated risks to individuals and costs to society (Wolf and Colditz, 1998; Swinburn *et al.*, 2011), and (b) the increasing self-responsibility for making consequential financial decisions (van Rooij *et al.*, 2011). Knowledge of whether and how

personality traits explain trade-offs or consistency in individuals' behavior across the health and financial domain also answers calls for more research on the role of psychological factors in understanding individuals' health and financial behavior (Bertrand *et al.*, 2006; Briley and Aaker, 2006), and helps inform policymakers on how to steer individuals towards beneficial behaviors.

The remainder of this article is organized as follows. We first present the data and methodology, including an explanation of the data items used to construct the behavioral indices regarding individuals' health and financial behavior and the overlap between these two domains. We then present results, including our examination of the patterns of consistency between individuals' health and financial behaviors, the fundamental life outcomes associated with this overlap, and the extent to which personality traits as well as sociodemographic characteristics explain the patterns of consistency. Next, we present a robustness check with an alternative model specification to validate the baseline results. Afterwards, we discuss the results. Finally, we provide implications, discuss limitations which offer avenues for future research, and conclude.

2 | DATA AND METHODOLOGY

2.1 | Data source

Our analysis uses unit-record data gathered from individuals in the Household, Income and Labour Dynamics in Australia (HILDA) Survey, which is an annual household panel survey that began in 2001. Households are selected using a multi-staged approach which attempts to approximate a sample reflecting the characteristics of the Australian population (Wilkins *et al.*, 2019). The HILDA Survey is funded by the Australian Government Department of Social Services and has been used extensively in previous studies in economics as well as finance (Cobb-Clark *et al.*, 2016; e.g., Cobb-Clark *et al.*, 2014; Rohde *et al.*, 2017).² We use multiple data items which capture individuals' behaviors in the health and financial management domains (details are provided in the next section), and construct a behavioral index for each domain, inspired by the approach of Cobb-Clark *et al.* (2014). Health-related behaviors relate to exercise, sleep, and food and alcohol intake, while finance-related behaviors relate to paying bills, credit cards, saving, superannuation/retirement savings, insurance, and gambling.³ Most of the data items relevant to the construction of our health and finance-related indices are available in Wave 13 (collected in 2013) although some are only available in Wave 14 and 15 (collected in 2014 and 2015, respectively). We therefore interpret the index score to be a general reflection of a person's behavior over several years. Combining data items from various survey waves is consistent with the approach taken by Cobb-Clark *et al.* (2014).

Data on personality traits are not available in every survey wave. We use data on personality traits collected in the year of the HILDA Survey that is closest to the years from which our health and financial behavior data are drawn. This approach is supported by a broad literature showing that, after a period of malleability throughout childhood and adolescence, an individual's personality traits tend to stabilize by the time they reach adulthood (Costa and McCrae, 1988; Roberts and DelVecchio, 2000; Costa *et al.*, 2001; Almlund *et al.*, 2011; Cobb-Clark and Schurer, 2012). Furthermore, past studies show that personality traits are unrelated or only weakly responsive to major life shocks (Cobb-Clark and Schurer, 2012; Cobb-Clark and Schurer, 2013).

Our sample is restricted to individuals who are of working age (18–64 years) and who are employed for each of the 3 years from which we collect data. This is because one of our data items for the financial behavior index (i.e., superannuation contributions) and one of our control variables (i.e., income) pertains to employment.⁴ Our sample includes a total of 4,285 individuals providing sufficient information to generate an index value for both their health and financial management behaviors. Allowing for missing and invalid observations for the variables included in the construction of the health and financial behavior indices and among the control variables used in our models, our estimations are based on a sample of 3,752 individuals.⁵ Including each of the personality trait variables in our estimations reduces this sample size fractionally, due to some item non-response for these personality trait variables (see the notes below the tables of results for details).

2.2 | Constructing health and financial behavior indices and defining quadrants of overlap

Table 1 outlines the behaviors used to construct the domain-specific indices. All indicators are numerically defined to take a value of 1 in association with a behavior that is considered beneficial (e.g., not smoking or having no outstanding bills), and 0 in association with a behavior that

TABLE 1 Indicators used to define health and financial management behavioral indices

Variable	Definition
<i>Health behavior indicators</i>	
1. Exercise	1 = exercises (moderate physical activity) more than 3 days per week 0 = exercises (moderate physical activity) fewer than 3 days per week
2. Eat breakfast	1 = eats breakfast 7 days per week 0 = eats breakfast fewer than 7 days per week
3. Fruit and vegetables	1 = eats fruit and vegetables every day 0 = does not eat fruit and vegetables every day
4. Sleep	1 = usually sleeps between 7 to 9 hours per night 0 = usually sleeps fewer than 7 or more than 9 hours per night
5. Avoid binge-drinking	1 = did not binge-drink during past year 0 = did binge-drink during past year
6. Avoid smoking	1 = does not smoke 0 = smokes
7. Avoid snack food	1 = eats snack food no more than once per week 0 = eats snack food more than once per week
<i>Financial management behavior indicators</i>	
1. Household bills	1 = household has no outstanding bills 0 = household has at least one outstanding bill
2. Personal bills	1 = individual has no outstanding personal bills 0 = individual has at least one outstanding personal bill
3. Credit card repayment	1 = always pays off credit card's monthly balance 0 = does not always pay off credit card's monthly balance

(Continues)

TABLE 1 (Continued)

Variable	Definition
4. Savings habits	1 = saves regularly by putting money aside 0 = does not save regularly by putting money aside
5. Superannuation	1 = regularly makes personal contribution to superannuation account 0 = does not regularly make personal contribution to superannuation account
6. Health insurance ^a	1 = has private health insurance 0 = does not have private health insurance
7. Avoid gambling	1 = does not participate in any type of gambling in a typical month 0 = participates in any type of gambling in a typical month

Note: The grouping of binary variables regarding the health behavior indicators (e.g., a cutoff value for exercise of 3 days a week) is based on previous literature which finds that scoring in this particular way regarding each of the seven healthy habits is predictive of an individual's (future) health status and longevity/mortality. For a detailed discussion of this literature and the particular cut-off values used, see Schoenborn (1986) and Cobb-Clark *et al.* (2014). A value of 1 denotes beneficial behavior while a value of 0 denotes detrimental behavior. Exercise is defined as participating in moderate or intensive physical activity for 30 min (see Wooden, 2014). Household bills include: electricity/gas; water/sewerage; telephone (excluding mobile phones); council rates, rent or strata fees; home and contents insurance; childcare; school fees; pay TV; and internet connections. Personal bills include: personal expenses such as mobile phone; car registration and insurance; gym membership (exclude personal loans, credit card bills, and household bills). Gambling activities include: instant scratch tickets ("scratchies"); bingo; lotto or lottery games, such as Powerball or Oz Lotto; Keno; private betting (e.g., playing cards or mah-jong with friends and family); poker; casino table games (e.g., blackjack, roulette); poker machines ("pokies") or slot machines; betting on horse or dog races (excluding sweeps); betting on sports. A dummy variable to identify these individuals is included in the statistical regression. *Source:* Data for health behaviors are based on data collected in the 2013 HILDA Survey. Data for financial management behaviors are based on data collected across different years of the HILDA Survey due to variations in data availability as follows: 2013 (household bills; personal bills; credit card; health insurance), 2014 (savings habits; superannuation) and 2015 (gambling).

^aIndividuals who do not need to purchase private health insurance, due to eligibility for government assistance such as pensions, are also assigned a value of 1.

is considered detrimental (e.g., smoking or having outstanding bills). Our choice of data items to construct the behavioral index for a healthy lifestyle is informed by previous applications in the literature, namely the Alameda 7 Index (Schoenborn, 1986) which was adopted by Cobb-Clark *et al.* (2014) in their analysis of diet and exercise behavior also using HILDA Survey data. Our choice of data items to construct the behavioral index for financially responsible behavior is informed by Hilgert *et al.* (2003), who identify cash-flow management, credit management, saving, and investment as key dimensions of an individual's financial management behavior (see Table 2 for details). We have no priors as to whether one particular health or financial behavior has more importance than others, and therefore follow prior literature in not applying any weighting to the different data items (Cobb-Clark *et al.*, 2014).

Using each individual's domain-specific index values, we identify four possible combinations of behaviors spanning both the health and financial management domains. On the one hand, an individual might demonstrate consistency in their behavior across both domains, either through displaying both beneficial health and beneficial financial management behavior, or by displaying both detrimental health and detrimental financial management behavior. On the other hand, an individual might demonstrate overall beneficial behavior in the health

TABLE 2 Summary statistics of health and financial management behavioral indicators

Behavioral domain	Full sample		Estimation sample	
	Mean	SD	Mean	SD
<i>Health behavior indicators</i>				
Exercise	0.386	(0.487)	0.370	(0.483)
Eat breakfast	0.655	(0.475)	0.660	(0.474)
Fruit and vegetables	0.271	(0.444)	0.274	(0.446)
Sleep	0.658	(0.475)	0.658	(0.475)
Avoid binge-drinking	0.366	(0.482)	0.369	(0.482)
Avoid smoking	0.823	(0.381)	0.836	(0.371)
Avoid snack food	0.562	(0.496)	0.561	(0.496)
Health behavior index	0.532	(0.206)	0.532	(0.204)
Number of observations	5,518		3,752	
<i>Financial management behavior indicators</i>				
Household bills	0.930	(0.254)	0.933	(0.249)
Personal bills	0.963	(0.188)	0.969	(0.173)
Credit card repayment	0.405	(0.491)	0.405	(0.491)
Savings habits	0.326	(0.469)	0.331	(0.471)
Superannuation	0.189	(0.392)	0.195	(0.396)
Health insurance	0.692	(0.462)	0.698	(0.459)
Avoid gambling	0.615	(0.487)	0.614	(0.487)
Financial management behavior index	0.589	(0.181)	0.592	(0.180)
Number of observations	5,826		3,752	

Note: Index values are standardized to take a value between 0 and 1. Sample of individuals who were aged between 18 and 64 years and employed. Full sample includes all individuals for whom data on the respective indicators were available. Estimation sample refers to the individuals for whom all data on all control variables used in the model estimation were also available. See notes for Table 1 for information on the years of data collection. *Source:* Authors' calculations using HILDA Survey data.

domain, but overall detrimental behavior in the financial management domain, or vice versa. This pattern could be interpreted as a potential trade-off in behavior. These four combinations of behavior can be conceptualized as quadrants (Figure 1). In the remainder of the article, we are specifically interested in predicting who is in which quadrant, based on their personality traits and sociodemographics.

We have seven indicators of behavior within the health and financial management behavior domains, respectively. However, very few individuals fulfill or fail to fulfill all seven criteria of beneficial behaviors within each domain. Hence, the process of classifying which individuals are considered to be, overall, engaging in beneficial or detrimental behavior within each domain requires choosing a meaningful threshold value. We define an individual as engaging in “beneficial” behavior overall if they display beneficial behavior for the majority of the individual indicators within each given domain (i.e., four or more of the seven), and “detrimental” otherwise.

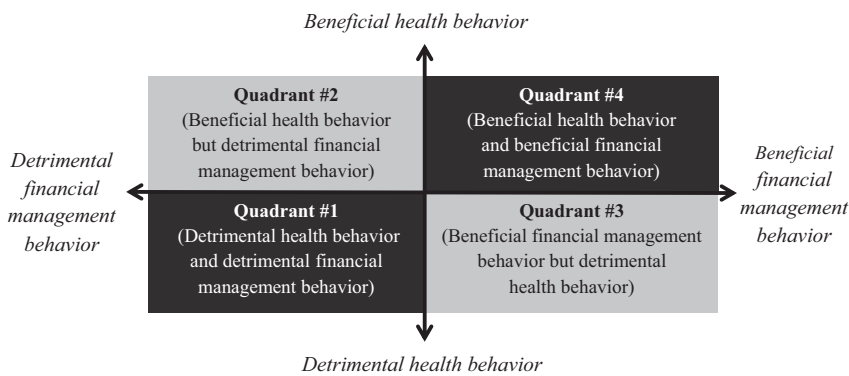


FIGURE 1 Illustration of health and financial management quadrants of behavior. *Notes:* The darker-shaded quadrants denote consistency in behavior across the health and financial management behavior domains, while the lighter-shaded quadrants denote a potential trade-off or inconsistency in behavior across the health and financial management behavior domains. Sample of 4,285 individuals for whom data on all behavioral indicators are available

2.3 | Personality traits

We investigate the explanatory power of three key aspects of an individual's personality with demonstrated relevance in predicting behavior in the health and financial domain. That is, we study the explanatory power of Locus of Control (LOC) (Rotter, 1966, 1954), the Big Five personality traits (Costa and McCrae, 1992, 1985), and Achievement Motivation (Murray, 1938; McClelland *et al.*, 1953; Atkinson, 1964; Nicholls, 1984; McClelland, 1987) regarding individuals' degree of consistency in simultaneously engaging in a healthy lifestyle and financially responsible behavior.

LOC is defined as a general, relatively stable, propensity to see the world in a particular way, capturing individuals' general beliefs about the causes of rewards and punishments (Rotter, 1966). It refers to the extent to which an individual believes that life outcomes are within their personal control and dependent on their own efforts and choices (internal LOC), rather than being dependent on fate, luck, others, or further external factors (external LOC). The two loci values can be combined to construct a "net" value (Cobb-Clark and Schurer, 2013). An internal LOC is positively correlated with both a healthy lifestyle in terms of engaging in regular exercise and following a healthy diet (Cobb-Clark *et al.*, 2014), and financial prudence in terms of savings behavior (Cobb-Clark *et al.*, 2016), budgeting, and controlling spending (Perry and Morris, 2005).

The Big Five model is one of the dominant paradigms for classifying and measuring an individual's personality traits (McCrae and John, 1992), and comprises agreeableness, conscientiousness, emotional stability, extraversion, and openness to experience. The Big Five personality traits help understand health behavior in terms of exercise, a healthy diet, smoking, and drinking (Booth-Kewley and Vickers, 1994) and financial behavior in terms of saving (Nyhus and Webley, 2001; Mosca and McCrory, 2016; Brown and Brown and Taylor, 2014; Gerhard *et al.*, 2018; Asebedo *et al.*, 2019).

Achievement Motivation refers to an individual's drive to demonstrate the mastery of a task and comprises two distinct components: hope for success and fear of failure (Nicholls, 1984; McClelland, 1987). Hope for success is manifested by the degree to which an individual favors

situations where they are challenged and can test their capabilities, and thus is interpreted to reflect their willingness and confidence to take on a challenge. Fear of failure is manifested by the degree to which an individual expects to perform poorly on a given task, or feels apprehensive about doing so, which can therefore detract from their readiness to be challenged. Hope for success relates to an approach orientation, while fear of failure relates to an avoidance orientation (Elliot and Harackiewicz, 1996). This approach-avoidance orientation helps explain health behavior such as exercising regularly or refraining from smoking (Sherman *et al.*, 2006; Mann *et al.*, 2013), and financial behavior such as stock trading or insurance take-up (Zhou and Pham, 2004; Millet *et al.*, 2012).

All personality trait variables discussed above are reliable measures, as evidenced by Cronbach's alpha values which are above the minimum cut-off level of .70 (Nunnally, 1978).⁶

2.4 | Control variables

Based on prior literature using the HILDA Survey data (Cobb-Clark *et al.*, 2014; Cobb-Clark *et al.*, 2016), we control in our analysis for a range of standard socio-economic and demographic characteristics that could also explain individuals' health and financial behaviors. Doing so ensures that our results provide a more precise account of the effects of the personality traits and are not driven by any differences in socio-economic or demographic characteristics. The control variables include gender, age, educational attainment, household income, long work hours, cognitive ability, relationship status, number of children/dependents, caring responsibilities, and location. Table 3 describes all variables used in our model estimations and provides relevant summary statistics.

2.5 | Modeling methodology

We are interested in estimating the likelihood that an individual belongs to one of the four quadrants as a function of their personality traits and aforementioned socio-economic and demographic control variables. The categorical nature of the outcomes under analysis makes it appropriate to apply a discrete choice model (Greene, 2003). The application of a discrete choice model requires us to consider whether the four quadrant outcomes are assumed to follow an inherent linear ordering. We begin with a multinomial logit (MNL) specification under the assumption that the four quadrants are unordered in nature. This assumption accommodates the fact that, although quadrant 4 (beneficial health behavior and beneficial financial management behavior) may be associated with better life outcomes than both quadrant 2 (beneficial health behavior but detrimental financial management behavior) and quadrant 3 (detrimental health behavior but beneficial financial management behavior), which are in turn superior to quadrant 1 (detrimental health behavior and detrimental financial management behavior), we cannot necessarily discern between the two "trade-off" categories (quadrants 2 and 3) in terms of superiority of outcomes. Nevertheless, as a robustness check, we also apply an ordered probit model which assumes that an inherent ranking exists among the outcome categories (McKelvey and Zavoina, 1975). The associated modeling specification and results are reported in Section 4.

The MNL is founded on a random utility maximization model which assumes that individual i , when faced with J possible categories, will arrive at the outcome which gives them the highest utility compared to all of the possible outcomes. The individual's utility is a latent variable that is unobserved, but can be expressed as follows:

TABLE 3 Description and summary statistics of variables

Variables	Description	Mean	SD
<i>Outcome variable</i>			
MNL model: Quadrant (unordered))	1 = simultaneous unfavorable health behaviors and financial management behaviors 2 = favorable health behaviors but unfavorable financial management behaviors 3 = unfavorable health behaviors but favorable financial management behaviors 4 = simultaneous favorable health behaviors and financial management behaviors	2.959	(1.105)
Ordered probit model: Quadrant (ordered)	1 = simultaneous unfavorable health behaviors and financial management behaviors 2 = trade-off behavior (favorable health behaviors but unfavorable financial management behaviors or unfavorable health behaviors but favorable financial management behaviors) 3 = simultaneous favorable health behaviors and financial management behaviors	2.261	(0.723)
<i>Socio-economic and demographic characteristics</i>			
Female	0 = male; 1 = female	0.486	(0.500)
Age 18–29 years (<i>base</i>)	0 = no; 1 = yes	0.253	(0.435)
Age 30–39 years	0 = no; 1 = yes	0.226	(0.418)
Age 40–49 years	0 = no; 1 = yes	0.258	(0.438)
Age 50–64 years	0 = no; 1 = yes	0.263	(0.440)
Secondary school education (<i>base</i>)	0 = no; 1 = yes (secondary school education or below)	0.311	(0.463)
Vocational qualification	0 = no; 1 = yes (certificate III or IV/diploma)	0.337	(0.473)
University qualification	0 = no; 1 = yes (undergraduate/postgraduate degree)	0.352	(0.478)
Personal income (ln)	Natural log of financial year personal disposable income from all sources (AUD \$)	10.724	(0.915)
Long work hours	0 = no; 1 = yes (whether regularly works long hours [45 hr per week or more])	0.282	(0.450)
Cognitive ability ^a	Average of three cognitive tests scores scaled from 0 (lowest) to 1 (highest)	0.565	(0.117)
Partnered	0 = no (single/separated/divorced/ widowed); 1 = yes (married/de facto)	0.710	(0.454)
Children/dependents	0 = no; 1 = yes (has children aged less than 15 years or dependent students in household)	0.500	(0.500)
Carer responsibilities	0 = no; 1 = yes	0.049	(0.217)
Metropolitan location	0 = outer regional, remote or very remote; 1 = major city or inner regional	0.919	(0.273)

TABLE 3 (Continued)

Variables	Description	Mean	SD
<i>Personality characteristics</i>			
Locus of control (LOC)	Average response to “How much you agree or disagree with each of the following statements?” on a scale from 1 (strongly disagree) to 7 (strongly agree):		
	“What happens to me in the future mostly depends on me” “I can do just about anything I really set my mind to do” “I have little control over the things that happen to me” ^b “There is really no way I can solve some of the problems I have” ^b “There is little I can do to change many of the important things in my life” ^b “I often feel helpless in dealing with the problems of life” ^b “Sometimes I feel that I’m being pushed around in life” ^b	5.602	(1.016)
Achievement motivation	Average response to “How much you agree or disagree with each of the following statements?” on a scale from 1 (strongly disagree) to 7 (strongly agree):		
Hope for success	“When confronted by a difficult problem, I prefer to start working on it straight away” “I like situations where I can find out how capable I am” “I enjoy situations that make use of my abilities” “I am attracted to tasks that allow me to test my abilities”	5.374	(0.967)
Fear of failure	“I start feeling anxious if I do not understand a problem immediately” “Even when nobody is watching, I feel anxious in new situations” “In difficult situations where a lot depends on me, I am afraid of failing” “I am afraid of tasks that I cannot work out or solve” “I feel uneasy about undertaking a task if I am unsure of succeeding”	3.570	(1.303)
Big five personality traits	Average response to “How much you agree or disagree with each of the following statements?” on a scale from 1 (strongly disagree) to 7 (strongly agree):		
Agreeableness	Cooperative; kind; sympathetic; warm	5.455	(0.854)
Conscientiousness	Efficient; orderly; systematic; disorganized ^b ; inefficient ^b ; sloppy ^b	5.192	(0.988)

(Continues)

TABLE 3 (Continued)

Variables	Description	Mean	SD
Extraversion	Talkative; extraverted; lively; jealous ^b ; bashful ^b ; quiet ^b ; shy ^b	5.110	(1.037)
Emotional stability	Envious ^b ; fretful ^b ; deep moody ^b ; temperamental ^b ; touchy ^b	4.437	(1.112)
Openness to experience	Complex; creative; imaginative; intellectual; philosophical	4.270	(1.009)
Number of observations		3,752	

Note: Sample of individuals who were aged between 18 and 64 years and employed. Estimation sample refers to the individuals for whom all data on all control variables used in the model estimation were also available. For numerical interpretability, the values of all personality traits variables were standardized to a mean of 0 and *SD* of 1 in the estimation. Questionnaire items for the personality traits sourced from the Melbourne Institute of Applied Economic and Social Research (2011, 2012, 2013)). Data for LOC were collected in 2011; data for the Big Five personality traits were collected in 2013; data for Achievement Motivation were collected in 2012; data for all socio-economic and demographic characteristics were collected in 2013 unless otherwise indicated. *Source:* Authors' analysis using HILDA Survey data.

^aFor cognitive ability, we use the average test result on three types of cognitive tests that were undertaken as part of the 2012 HILDA Survey: a Backward Digit Span Test (a test of memory); a Symbol Digits Modalities Test (a test of attention, visual scanning, and motor speed); and the National Adult Reading Test (a word pronunciation test regarded as a measure of intelligence) (see Wooden, 2013).

^bThese responses were reversed in value when computing the overall value of the relevant personality trait.

$$U_{ij} = x'_{ij}\beta_j + \varepsilon_{ij} \quad (i = 1, \dots, N; j = 1, 2, \dots, J) \quad (1)$$

where x_{ij} is a vector of explanatory variables, β are coefficients to be estimated, and ε_{ij} is the random error term.⁷

Subject to the set of explanatory variables, the decision rule underlying an individual's behavior is that their observed outcome (y_i) will equate to category j if and only if this is the option that generates the highest utility to them, as follows:

$$y_i = j \text{ iff. } U_{ij} > U_{ik} \text{ for all } k \neq j \quad (j, k = 1, 2, \dots, J) \quad (2)$$

This decision can be expressed as a probability, where the probability that individual i will be observed to fall into category j is as follows:

$$P(y_i = j | x_i) = \frac{e^{x'_{ij}\beta_j}}{\sum_{k=1}^J e^{x'_{ik}\beta_k}}, \quad (j = 1, 2, \dots, J) \quad (3)$$

where it is assumed that ε_{ij} are independently and identically distributed and follow a Type I extreme value distribution where $F(\varepsilon_{ij}) = \exp[-\exp(-\varepsilon_{ij})]$. We can parameterize the MNL probability by way of maximum likelihood estimation, according to the log-likelihood function outlined in Greene (2003).

We report the MNL marginal effects, equating to the change in the probability of an individual belonging to category j for a given change in explanatory variable k :

$$\frac{\partial P(y=j|x)}{\partial x_k} = P_j \left[\beta_{jk} - \sum_{l=1}^J P_l \beta_{lk} \right] = P_j \left[\beta_{jk} - \bar{\beta}_k \right] \quad (4)$$

A key assumption underlying the MNL is that the probability of belonging to one category, relative to another, is unaffected by the availability of any other categories, formalized as the assumption of the Independence from Irrelevant Alternatives (IIA). A Hausman Test is conducted to test whether the IIA holds, based on the significance of the difference between the parameters of a full and subset specification. The following test statistic applies:

$$\chi_k^2 = \left(\hat{\beta}_s - \hat{\beta}_f \right)' \left(\hat{V}_s - \hat{V}_f \right)^{-1} \left(\hat{\beta}_s - \hat{\beta}_f \right) \quad (5)$$

where s denotes the subset specification which omits one of the outcome categories, f denotes the full specification, β are coefficients to be estimated, and V denotes the estimated asymptotic covariance matrices of the respective specifications.

Our set of explanatory variables includes not only the characteristics that reflect an individual's preference or aptitude to opt into a particular category of behavior as captured by their personality traits, but also the wider range of factors that may determine their outcomes including socio-economic and demographic characteristics that may constrain their capacity to pursue their preferred behavior. We may therefore consider this set of explanatory variables to capture not only the factors that shape an individual's *willingness* to engage in beneficial behaviors (and to refrain from detrimental ones), but also the factors that shape their *ability* to act on this willingness. This approach is consistent with Katona's (1975) distinction between an individual's willingness versus ability to save. In the MNL modeling specification, it is assumed that the characteristics of the individual are not choice-specific, but are the same for the individual across all of their choices.

3 | RESULTS

3.1 | Descriptive characteristics of individuals according to their health and financial behaviors

To explore how the values of the behavioral indicators and indices are patterned according to an individual's socio-economic and demographic characteristics, we visually plot the value of each health and financial behavior indicator and the standardized overall index score according to some key characteristics (Figures 2–5). The confidence intervals indicate that most of these differences are statistically significant. This analysis serves to establish that variation exists in the values of indicators and indices, dispersed according to a range of personal characteristics and confirms the importance of controlling for these characteristics when predicting quadrant membership.

Figure 2 illustrates that, overall, women display more beneficial health behaviors than men, indicated by a standardized score on the health index of 0.568 compared to 0.500, respectively. Among the most pronounced gender differences, a higher share of men engage in healthy behavior with respect to regular exercise (44.2% for men vs. 33.2% for women), but a higher proportion of women display healthy behavior in terms of meeting the minimum recommended

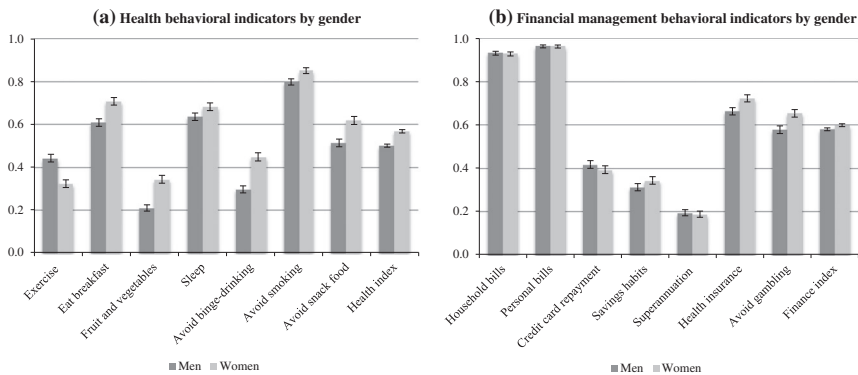


FIGURE 2 Mean values of behavioral indicators by gender. *Notes:* Vertical bars indicate 95% confidence intervals around the mean. Sample of individuals who were aged between 18 and 64 years inclusive and employed, for whom all variables were available. Sample size for health behavior indicators: 2,949 men and 2,569 women. Sample size for financial management behavior indicators: 2,978 men and 2,848 women. *Source:* Authors' calculations using HILDA Survey data

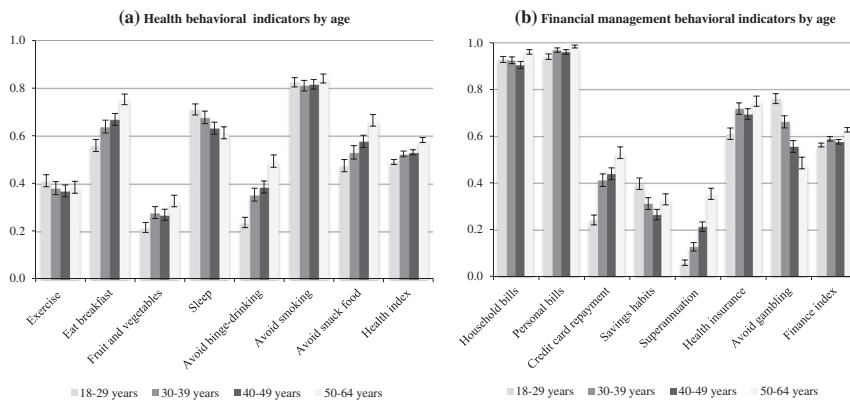


FIGURE 3 Mean values of behavioral indicators by age. *Notes:* Vertical bars indicate 95% confidence intervals around the mean. Sample of individuals who were aged between 18 and 64 years inclusive and employed, for whom all variables were available. Sample size for health behavior indicators: 1,465 for 18–29 years; 1,209 for 30–39 years; 1,407 for 40–49 years; 1,437 for 50–64 years. Sample size for financial management behavior indicators: 1,531 for 18–29 years; 1,285 for 30–39 years; 1,489 for 40–49 years; 1,521 for 50–64 years. *Source:* Authors' calculations using HILDA Survey data

consumption of fruit and vegetables (34.3% for women vs. 20.8% for men) and avoiding binge-drinking (44.8% for women vs. 29.5% for men). There is less gender variation in financial management behaviors, although most notably, a higher share of women take out health insurance (72.3% for women vs. 66.3% for men) and avoid gambling (65.3% for women vs. 57.8% for men).

Figure 3 indicates that older age groups generally display more beneficial health behaviors than younger age groups, indicated by the standardized score on the finance index of 0.582 for individuals between 50 and 64 years versus 0.490 for individuals between 18 and 29 years, respectively. Older age groups score better regarding the various dimensions of eating healthily and in particular avoiding binge-drinking (49.3% for the oldest age group vs. 23.5% for the

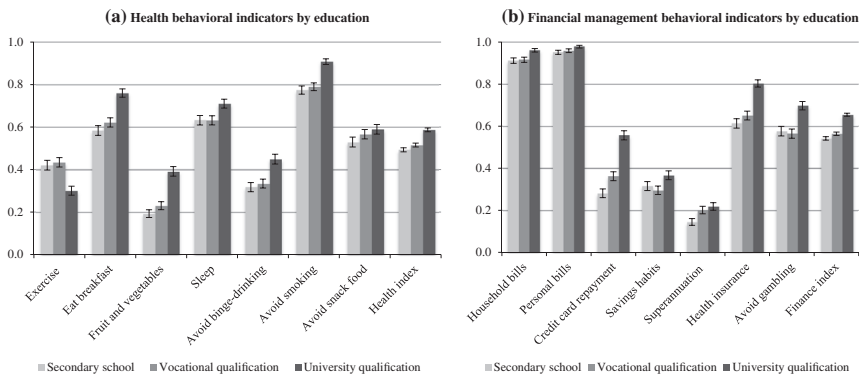


FIGURE 4 Mean values of behavioral indicators by education. *Notes:* Vertical bars indicate 95% confidence intervals around the mean. Sample of individuals who were aged between 18 and 64 years inclusive and employed, for whom all variables were available. Sample size for health behavioral indicators: 1,781 for secondary school; 1,931 for vocational qualification; 1,806 for university qualification. Sample size for financial management behavioral indicators: 1,818 for secondary school; 1,978 for vocational qualification; 2,030 for university qualification. *Source:* Authors' calculations using HILDA Survey data

youngest age group), but younger age groups display better sleep habits (with 71.1% of the youngest age group getting the recommended number of hours of sleep vs. 61.2% of the oldest age group). A higher share of older individuals engage in beneficial behaviors with respect to credit card management (with 52.9% of the oldest age group always paying off their monthly balances vs. 24.1% of the youngest age group doing the same) and superannuation contributions (with 35.3% of the oldest age group making regular personal contributions vs. 5.8% of the youngest age group doing so). A larger share of young people display beneficial behaviors regarding saving (with 39.6% of the youngest age group saving regularly vs. 32.9% of the oldest age group doing the same) and gambling habits (with 76.1% of the youngest age group avoiding gambling vs. 48.5% of the oldest age group doing the same).

Figure 4 indicates that a larger share of highly-educated individuals engage in beneficial health behaviors in terms of the various dimensions of eating healthily (with 76.0% of those with a university education eating breakfast 7 days a week vs. 58.4% of those with secondary school doing so, 39.1% of those with a university education eating fruit and vegetables every day vs. 19.3% of those with secondary school doing so, 44.9% of those with a university education avoiding binge drinking vs. 31.7% of those with secondary school doing so, and 59.0% of those with a university education avoiding snack food vs. 52.9% of those with secondary school doing so), sleeping the recommended hours per night (with 71.0% of those with a university education doing so vs. 63.2% of those with secondary school doing so), binge-drinking (with 44.9% of those with a university education avoiding it vs. 31.7% of those with secondary school doing so) and smoking habits (with 90.8% of those with a university education avoiding it vs. 77.4% of those with secondary school doing so). However, a higher share of less-educated individuals (42.1%) undertakes regular exercise compared to more-educated individuals (30.1%). In a similar fashion, more-educated individuals display more beneficial financial behaviors than less-educated individuals, including paying off monthly credit card balances (with 55.7% of those with a university education always doing so vs. 28.1% of those with secondary school doing so), taking out health insurance (with 80.3% of those with a university education having

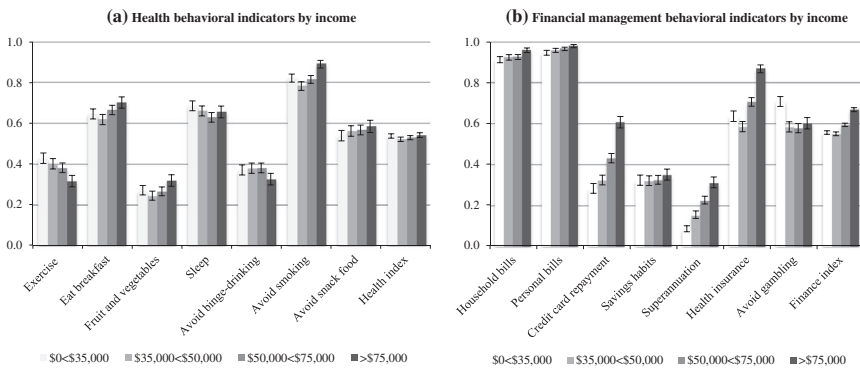


FIGURE 5 Mean values of behavioral indicators by income. *Notes:* Vertical bars indicate 95% confidence intervals around the mean. Sample of individuals who were aged between 18 and 64 years inclusive and employed, for whom all variables were available. Sample sizes for health behavioral indicators: 1,421 for income \$0 < \$35,000; 1,418 for income \$35,000 < \$50,000; 1,594 for income \$50,000 < \$75,000; 1,038 for income > \$75,000. Sample sizes for financial management behavioral indicators: 1,336 for income \$0 < \$35,000; 1,478 for income \$35,000 < \$50,000; 1,802 for income \$50,000 < \$75,000; 1,173 for income > \$75,000. *Source:* Authors' calculations using HILDA Survey data

a policy vs. 61.3% of those with secondary school), and gambling habits (with 69.8% of those with a university education avoiding it vs. 54.2% of those with secondary school).

Figure 5 illustrates that although, overall, higher income earners do not differ profoundly from lower income earners in their health behaviors as indicated by a standardized score on the health index of 0.542 compared to 0.537, respectively, higher income earners do engage in more healthy behavior with respect to fruit and vegetables intake (with 31.8% of the highest income earners eating the recommended intake vs. 24.3% of the second-lowest income earners) and avoiding smoking (with 89.1% of the highest income earners doing so vs. 82.3% of the lowest income earners), while those in lower income brackets participate more in exercise (with 42.8% of the lowest income earners doing so regularly vs. 31.5% of the highest income earners). Unsurprisingly, higher income earners display more beneficial financial behaviors, particularly in relation to paying off monthly credit card balances (with 60.6% of the highest income earners always doing so vs. 28.1% of the lowest income earners doing the same), making personal superannuation contributions (with 31% of the highest income earners doing so vs. 8.2% of the lowest income earners), and taking out health insurance (with 86.9% of the highest income earners having a policy vs. 63.5% of the lowest income earners).

Overall, these descriptive results make intuitive sense and are consistent with prior work on the relationship between socio-economic and demographic characteristics and individuals' health and financial management behaviors (Contoyannis and Jones, 2004; van Rooij *et al.*, 2011).

3.2 | Sample distribution across the quadrants

Using aforementioned thresholds regarding beneficial and detrimental health and financial management behaviors, we assign each individual to a quadrant and compute the total proportion of our sample that falls into each quadrant as illustrated in Figure 1. Around 42% of the

sample demonstrates both beneficial health and beneficial financial management behaviors. We will refer to these individuals as the “consistently beneficial.” The next most common quadrant to belong to, with 28% of the sample, is the combination of beneficial financial management behavior with detrimental health behavior. Another 14% of the sample display the converse combination of beneficial health behavior with detrimental financial management behavior. We will refer to individuals in these latter two quadrants as the “inconsistent.” Completing the sample, around 16% of individuals display detrimental behaviors across both the health and financial management domains. We will refer to this last quadrant as the “consistently detrimental.”

These figures mean that, in summing the consistently beneficial and consistently detrimental quadrants, a total of 58% of individuals demonstrate consistent behavior across both domains. In summing the two inconsistent quadrants, the remaining 42% of individuals display a potential trade-off in executing self-control across the health and financial management domains.

3.3 | Link between quadrants and life outcomes

To illustrate the relevance of analyzing an individual's consistency in behavior across the health and financial management domains, and confirm the face validity of classifying them according to these quadrants, we inspect the association between quadrant membership and life outcomes (Figures 6 and 7). In terms of physical health, mental health, and financial wellbeing, measured both objectively and subjectively, those in the consistently detrimental quadrant tend to experience worse outcomes than those in the consistently beneficial quadrant, with those in the two inconsistent categories falling in between. The confidence intervals indicate that these differences are statistically significant.

With 29.1%, the consistently detrimental quadrant contains the largest proportion of individuals with an obese BMI and experiences the lowest overall health satisfaction with a standardized score of .772. Contrastingly, in the consistently beneficial quadrant, 17.3% of individuals are obese and the standardized health satisfaction score is .821. Further, the consistently detrimental quadrant contains the largest proportion of individuals who rate their financial prosperity as either “poor or very poor” (3.6%) or “just getting along” (42.0%). Those in this quadrant display the lowest overall satisfaction with their financial situation with a standardized score of .590. In contrast, the consistently beneficial quadrant contains the largest proportion of individuals who consider themselves “very comfortable or prosperous” (26.5%). Individuals in this quadrant experience the highest overall satisfaction with their financial situation with a standardized score of .714. Finally, the overall life satisfaction score of those in the consistently detrimental quadrant (.759) is significantly lower than those in the consistently beneficial quadrant (.809). These empirical patterns suggest a link between individuals' health and financial management behaviors and fundamental life outcomes.

3.4 | Link between personality traits and quadrants

Studying the mean levels of the personality traits across quadrants, we observe in Table 4 that individuals who display simultaneously beneficial behaviors across both domains possess relatively higher levels of net internal LOC (5.71), hope for success (5.41), agreeableness (5.54),

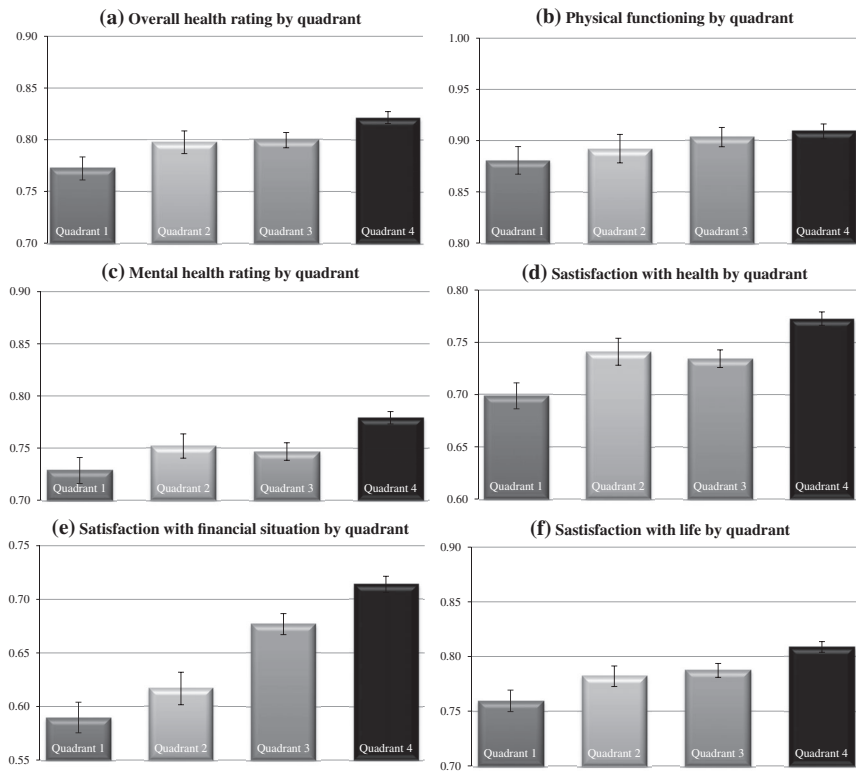


FIGURE 6 Mean values of health, financial and life outcomes by quadrant. *Notes:* Vertical bars indicate 95% confidence intervals around the mean. Health ratings are based on the Short Form (SF)-36 health questionnaire items (see Wooden, 2009), standardized to take a value from 0 (worst) to 1 (best). Sample size for overall health rating: 5,003. Sample size for physical functioning: 5,033. Sample size for mental health: 5,045. Sample size for satisfaction with health: 5,048. Sample size for satisfaction with financial situation: 5,050. Sample size of satisfaction with life: 5,050. *Source:* Authors' calculations using HILDA Survey data

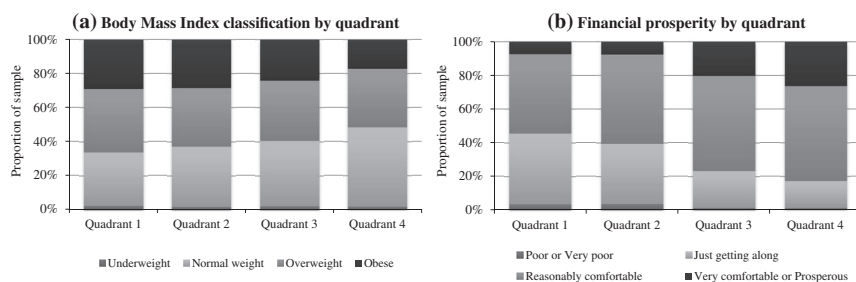


FIGURE 7 Categorical health and financial outcomes by quadrant. *Notes:* Body Mass Index (BMI) classifications are defined as: Underweight if BMI is less than 18.5; Normal weight if BMI falls between 18.5 and 25; Overweight if BMI falls between 25 and 30; and Obese if BMI is 30 or higher. Financial prosperity is a self-rated measure. Sample size for BMI classifications: 4,092. Sample size for financial prosperity: 5,032 *Source:* Authors' calculations using HILDA Survey data

TABLE 4 Mean level of individuals' personality traits according to quadrant

Personality trait	Quadrant #1 (detrimental health and financial behaviors)	Quadrant #2 (beneficial health but detrimental financial behaviors)	Quadrant #3 (beneficial financial but detrimental health behaviors)	Quadrant #4 (beneficial health and financial behaviors)	ANOVA test <i>F</i> -statistic (Prob > <i>F</i>)
<i>Locus of control</i>					
Net internal LOC	5.37 (5.28–5.45)	5.51 (5.42–5.60)	5.62 (5.56–5.67)	5.71 (5.67–5.76)	21.50*** (0.0000)
<i>Achievement motivation</i>					
Hope for success	5.24 (5.16–5.31)	5.33 (5.25–5.41)	5.35 (5.29–5.40)	5.41 (5.37–5.45)	5.52*** (0.0009)
Fear of failure	3.67 (3.57–3.77)	3.71 (3.60–3.81)	3.57 (3.50–3.64)	3.50 (3.45–3.56)	5.26** (0.0013)
<i>Big five traits</i>					
Agreeableness	5.29 (5.22–5.36)	5.52 (5.45–5.59)	5.39 (5.34–5.44)	5.54 (5.50–5.58)	15.23*** (0.0000)
Conscientiousness	4.87 (4.79–4.95)	5.12 (5.03–5.20)	5.11 (5.05–5.17)	5.40 (5.35–5.44)	49.81*** (0.0000)
Emotional stability	4.86 (4.77–4.94)	5.07 (4.98–5.16)	5.01 (4.94–5.07)	5.28 (5.24–5.33)	31.67*** (0.0000)
Extraversion	4.51 (4.42–4.59)	4.42 (4.33–4.51)	4.43 (4.36–4.49)	4.42 (4.36–4.48)	0.95 (0.4140)
Openness to experience	4.20 (4.13–4.28)	4.31 (4.23–4.40)	4.23 (4.16–4.29)	4.31 (4.26–4.36)	2.73* (0.0430)

Note: 95% confidence intervals range presented in parentheses. Number of observations: LOC: 3,460; Big Five personality traits: 3,743; Achievement Motivation: 3,579. The *F*-statistics for the Analysis of Variance (ANOVA) test indicates whether at least one of the quadrant categories differs in mean value from the remaining categories. All ANOVA tests were performed with 3 degrees of freedom. The ranges presented in the confidence intervals indicate which of the categories differ significantly at the 95% critical level. The ANOVA tests for the Big Five personality traits are conducted using Bonferroni corrections for multiple comparisons and the confidence intervals are adjusted accordingly. *Source:* Authors' calculations using HILDA Survey data.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

conscientiousness (5.40), and emotional stability (5.28), and a lower level of fear of failure (3.50). In contrast, those who display simultaneous detrimental behaviors across both domains are characterized by relatively lower levels of net internal LOC (5.37), hope for success (5.24), agreeableness (5.29), conscientiousness (4.87), and emotional stability (4.86), as well as a higher level of fear of failure (3.67). The confidence intervals show that these differences in means between the consistently detrimental individuals and the consistently beneficial individuals are

statistically significant.⁸ The personality trait scores of the inconsistent individuals fall in between those in the consistently detrimental and the consistently beneficial quadrants.

3.5 | Estimating the likelihood of belonging to each quadrant

We formally model the likelihood of an individual being in each quadrant as a discrete choice function dependent on aforementioned set of socio-economic and demographic characteristics as well as the key personality traits (i.e., LOC, Big Five, Achievement Motivation). We use the socio-economic and demographic characteristics observed in 2013, noting that robustness checks verified the stability of the predictive significance of these control variables across different waves of observations.⁹ Using the MNL model specification, we first run a baseline model without any personality traits (Table 5), and then introduce each personality trait to assess its explanatory power above and beyond aforementioned socio-economic and demographic control variables (Table 6).

Table 5 shows the socio-economic and demographic characteristics which make it more likely that an individual falls into the consistently detrimental quadrant. Being male, not possessing any post-school educational qualifications, having lower cognitive ability, working long hours, and being single all predispose individuals to this quadrant. It is possible that these characteristics make it difficult to engage in beneficial behaviors. For example, working long hours could crowd out time that could otherwise be allocated towards exercise or preparing nutritious food. Similarly, lower cognitive ability may impair an individual's capacity to absorb and understand information about healthy food choices or financial products. Approaching retirement age reduces the likelihood of belonging to the consistently detrimental quadrant, although being younger in age does not necessarily predispose an individual to this quadrant. This finding suggests that the consistently detrimental status is not necessarily an early stage-of-life occurrence that individuals begin in and eventually transition through. Another telling result is that the likelihood of belonging to the consistently detrimental quadrant (and indeed any of the quadrants) is unrelated to an individual's income. In other words, individuals who demonstrate detrimental health and financial management behaviors are found across all income groups. Finally, we find that women, individuals with post-school educational qualifications, those having higher cognitive ability, who work short hours, and those who are partnered are more likely to be in the consistently beneficial quadrant.

Table 6 shows that the personality traits which make it more likely to be in the consistently detrimental quadrant are lower levels of internal LOC, lower levels of conscientiousness, lower levels of emotional stability, higher levels of extraversion, and lower levels of hope for success. Higher levels of conscientiousness, higher levels of emotional stability, and lower levels of extraversion make it more likely to be in the consistently beneficial quadrant. Importantly, these personality traits have significant explanatory power even while controlling for socioeconomic and demographic characteristics that could also drive individuals' health and financial management behaviors, such as their age, gender, educational attainment, cognitive ability, family situation, and work arrangements. This finding implies that policy programs or intervention strategies designed to try and assist or incentivize individuals to engage in more beneficial health and financial management behaviors should aim to appeal to aforementioned personality types.

TABLE 5 Multinomial logit estimation of likelihood of belonging to quadrant (marginal effects)

	Quadrant #1 (detrimental health and financial behaviors)		Quadrant #2 (beneficial health but detrimental financial behaviors)		Quadrant #3 (beneficial financial but detrimental health behaviors)		Quadrant #4 (beneficial health and financial behaviors)	
Variables	Marg. eff.	SE	Marg. eff.	SE	Marg. eff.	SE	Marg. eff.	SE
Female	−0.040	(0.012)***	0.024	(0.012)*	−0.076	(0.016)***	0.093	(0.018)***
Age 30–39 years	0.001	(0.018)	0.011	(0.018)	−0.030	(0.023)	0.018	(0.027)
Age 40–49 years	0.025	(0.016)	0.035	(0.017)*	−0.066	(0.023)**	0.006	(0.026)
Age 50–64 years	−0.082	(0.018)***	0.008	(0.017)	−0.073	(0.022)***	0.146	(0.025)***
Vocational qualification	−0.027	(0.013)*	0.016	(0.014)	−0.043	(0.019)*	0.054	(0.022)**
University qualification	−0.138	(0.016)***	−0.046	(0.016)**	−0.030	(0.020)	0.214	(0.023)***
Personal income (ln)	−0.008	(0.006)	−0.004	(0.007)	0.013	(0.010)	−0.001	(0.010)
Long work hours	0.029	(0.013)*	−0.012	(0.014)	0.022	(0.018)	−0.039	(0.020)*
Cognitive ability	−0.182	(0.052)***	−0.144	(0.052)**	0.058	(0.069)	0.268	(0.077)***
Partnered	−0.028	(0.013)*	0.008	(0.013)	−0.051	(0.018)**	0.071	(0.020)***
Children/dependents	−0.011	(0.012)	−0.033	(0.012)**	0.014	(0.016)	0.030	(0.018)
Carer responsibilities	0.035	(0.027)	−0.005	(0.027)	−0.019	(0.037)	−0.011	(0.039)
Metropolitan location	−0.011	(0.020)	−0.019	(0.019)	−0.006	(0.028)	0.036	(0.032)

Note: Marginal effects computed at the mean of the respective variable. The full set of coefficients and constant terms are not reported for brevity but are available from the authors. Number of observations: 3,752. The estimation uses socio-economic and demographic characteristics observed in 2013. Model criteria: Log likelihood: −4,615.03; LR χ^2 test statistic: 426.55 (39 degrees of freedom); Prob > χ^2 : 0.000; AIC: 9,314.05; BIC: 9,575.71 (42 degrees of freedom). The Hausman Test statistics (based on Equation (5)) find insufficient evidence to reject the null hypothesis that a systematic difference exists between full and partial specification parameters, hence it is concluded that the IIA assumption holds. *Source:* Authors' calculations using HILDA Survey data.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

4 | ROBUSTNESS CHECK: ORDERED PROBIT MODEL

To return to our initial assumption when applying the MNL model that the four quadrants are unordered, for robustness we also apply an ordered probit model which assumes that an inherent ranking does exist among the outcome categories (McKelvey and Zavoina, 1975). Aligning to the association we earlier observed between an individual's quadrant membership and life outcomes (Section 3.4), the ordered probit model accommodates an assumption that demonstrating beneficial behaviors in both domains (the consistently beneficial) is superior to demonstrating beneficial behaviors in only one domain (the inconsistent), which is in turn superior to demonstrating detrimental behaviors in both domains (the consistently detrimental). Since we cannot necessarily discern a ranking between the two quadrants of the inconsistent, we treat

TABLE 6 Multinomial logit estimation of likelihood of belonging to quadrant with inclusion of personality traits (marginal effects)

	Quadrant #1 (detrimental health and financial behaviors)		Quadrant #2 (beneficial health but detrimental financial behaviors)		Quadrant #3 (beneficial financial but detrimental health behaviors)		Quadrant #4 (beneficial health and financial behaviors)	
Variables	Marg. eff.	SE	Marg. eff.	SE	Marg. eff.	SE	Marg. eff.	SE
<i>With locus of control</i>								
Female	−0.044	(0.013)***	0.025	(0.013)*	−0.070	(0.017)***	0.089	(0.019)***
Age 30–39 years	0.005	(0.018)	0.014	(0.019)	−0.041	(0.025)	0.022	(0.028)
Age 40–49 years	0.028	(0.017)*	0.031	(0.018)*	−0.076	(0.024)**	0.017	(0.028)
Age 50–64 years	−0.075	(0.018)***	0.013	(0.018)	−0.092	(0.024)***	0.155	(0.027)***
Vocational qualification	−0.029	(0.014)*	0.017	(0.014)	−0.048	(0.020)*	0.060	(0.023)**
University qualification	−0.138	(0.016)***	−0.051	(0.016)***	−0.032	(0.021)	0.221	(0.024)***
Personal income (ln)	−0.008	(0.007)	−0.004	(0.007)	0.026	(0.012)*	−0.014	(0.011)
Long work hours	0.033	(0.014)*	−0.016	(0.015)	0.024	(0.018)	−0.041	(0.021)*
Cognitive ability	−0.127	(0.053)*	−0.144	(0.054)***	0.030	(0.072)	0.240	(0.082)***
Partnered	−0.038	(0.014)**	0.009	(0.014)	−0.046	(0.019)**	0.075	(0.022)***
Children/dependents	−0.006	(0.013)	−0.033	(0.013)**	0.016	(0.017)	0.023	(0.019)
Carer responsibilities	0.027	(0.027)	−0.001	(0.027)	−0.034	(0.039)	0.008	(0.041)
Metropolitan location	−0.001	(0.021)	−0.028	(0.020)	−0.008	(0.029)	0.037	(0.033)
Net internal LOC	−0.032	(0.006)***	−0.012	(0.006)*	−0.002	(0.008)	0.046	(0.009)***
<i>With big five traits</i>								
Female	−0.033	(0.013)**	0.027	(0.013)*	−0.085	(0.017)***	0.090	(0.019)***
Age 30–39 years	0.015	(0.017)	0.011	(0.019)	−0.026	(0.024)	0.000	(0.027)
Age 40–49 years	0.046	(0.016)**	0.036	(0.018)*	−0.060	(0.024)**	−0.023	(0.027)
Age 50–64 years	−0.055	(0.018)**	0.011	(0.017)	−0.063	(0.023)**	0.107	(0.026)***
Vocational qualification	−0.027	(0.013)*	0.013	(0.014)	−0.040	(0.020)*	0.054	(0.022)**
University qualification	−0.133	(0.016)***	−0.055	(0.016)***	−0.022	(0.021)	0.210	(0.023)***
Personal income (ln)	−0.006	(0.006)	−0.002	(0.007)	0.015	(0.010)	−0.007	(0.011)
Long work hours	0.028	(0.013)*	−0.011	(0.014)	0.024	(0.018)	−0.042	(0.021)*
Cognitive ability	−0.145	(0.052)**	−0.178	(0.054)***	0.109	(0.071)	0.214	(0.081)**
Partnered	−0.024	(0.013)*	0.012	(0.014)	−0.056	(0.018)***	0.068	(0.021)***
Children/dependents	−0.017	(0.012)	−0.032	(0.013)**	0.008	(0.016)	0.040	(0.019)*
Carer responsibilities	0.029	(0.027)	−0.006	(0.027)	−0.021	(0.038)	−0.003	(0.040)
Metropolitan location	−0.014	(0.020)	−0.021	(0.020)	−0.007	(0.028)	0.042	(0.032)
Agreeableness	−0.011	(0.006)*	0.009	(0.007)	0.004	(0.009)	−0.002	(0.010)

TABLE 6 (Continued)

	Quadrant #1 (detrimental health and financial behaviors)		Quadrant #2 (beneficial health but detrimental financial behaviors)		Quadrant #3 (beneficial financial but detrimental health behaviors)		Quadrant #4 (beneficial health and financial behaviors)	
Variables	Marg. eff.	SE	Marg. eff.	SE	Marg. eff.	SE	Marg. eff.	SE
Conscientiousness	−0.036	(0.006)***	−0.017	(0.006)**	−0.011	(0.008)	0.064	(0.010)***
Emotional stability	−0.026	(0.006)***	0.001	(0.007)	−0.035	(0.009)***	0.060	(0.010)***
Extraversion	0.022	(0.006)***	−0.004	(0.006)	0.007	(0.008)	−0.025	(0.009)**
Openness to experience	0.000	(0.007)	0.018	(0.007)**	−0.025	(0.009)**	0.007	(0.010)
<i>With achievement motivation</i>								
Female	−0.046	(0.013)***	0.023	(0.013)*	−0.073	(0.017)***	0.095	(0.019)***
Age 30–39 years	−0.004	(0.018)	0.015	(0.019)	−0.027	(0.024)	0.016	(0.027)
Age 40–49 years	0.021	(0.017)	0.041	(0.018)*	−0.069	(0.024)**	0.008	(0.027)
Age 50–64 years	−0.080	(0.018)***	0.012	(0.017)	−0.077	(0.023)***	0.145	(0.026)***
Vocational qualification	−0.024	(0.013)*	0.022	(0.014)	−0.050	(0.020)**	0.052	(0.023)*
University qualification	−0.136	(0.016)***	−0.047	(0.016)**	−0.035	(0.021)	0.218	(0.023)***
Personal income (ln)	−0.008	(0.006)	−0.004	(0.007)	0.020	(0.011)*	−0.008	(0.011)
Long work hours	0.033	(0.014)*	−0.015	(0.014)	0.029	(0.018)	−0.047	(0.021)*
Cognitive ability	−0.154	(0.053)**	−0.133	(0.053)**	0.048	(0.071)	0.239	(0.080)**
Partnered	−0.023	(0.014)	0.007	(0.014)	−0.063	(0.018)***	0.079	(0.021)***
Children/dependents	−0.017	(0.013)	−0.034	(0.013)**	0.021	(0.017)	0.030	(0.019)
Carer responsibilities	0.024	(0.028)	−0.005	(0.027)	−0.018	(0.038)	−0.001	(0.040)
Metropolitan location	0.000	(0.021)	−0.021	(0.020)	−0.012	(0.028)	0.033	(0.032)
Hope for success	−0.016	(0.006)**	0.005	(0.006)	−0.003	(0.009)	0.014	(0.010)
Fear of failure	0.005	(0.006)	0.009	(0.006)	0.000	(0.009)	−0.015	(0.010)

Note: Marginal effects computed at the mean of the respective variable. To estimate marginal effects, personality traits have been standardized to take a mean of 0 and *SD* of 1. The full set of coefficients and constant terms are not reported for brevity but are available from the authors. Number of observations: LOC model: 3,460; Big Five personality traits model: 3,743; Achievement Motivation model: 3,579. The estimation uses socioeconomic and demographic characteristics observed in 2013, LOC variable observed in 2012, Big Five personality trait variables observed in 2013, and Achievement Motivation observed in 2012. Model criteria: With LOC: Log likelihood: −4,206.15; LR χ^2 test statistic: 448.60 (42 degrees of freedom); Prob > χ^2 : 0.000; AIC: 8,502.30; BIC: 8,779.01 (45 degrees of freedom); With Big Five Traits: Log likelihood: −4,519.41; LR χ^2 test statistic: 592.67 (54 degrees of freedom); Prob > χ^2 : 0.000; AIC: 9,152.81; BIC: 9,507.79 (57 degrees of freedom); With Achievement Motivation: Log likelihood: −4,373.87; LR χ^2 test statistic: 432.68 (45 degrees of freedom); Prob > χ^2 : 0.000; AIC: 8,843.75; BIC: 9,140.53 (48 degrees of freedom); *Source:* Authors' calculations using HILDA Survey data.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

both outcome categories as equivalently beneficial and group them together as a single “middle” category in a three-category outcome set. The ordered probit model is based on a latent probability function with respect to individual i :

$$y_i = x_i' \beta_i + u_i \quad (6)$$

where y^* is the latent probability of the outcome variable of interest, x is the vector of explanatory variables which determine y^* , β are the coefficients estimated, and u is the error term which is assumed to follow a standard normal distribution.

Our observed outcomes (y_i) are assumed to align to a latent probability function (y_i^*) in the following way:

$$y = \begin{cases} 1 & \text{if } y^* \leq \mu_1 \\ 2 & \text{if } \mu_1 < y^* \leq \mu_2 \\ \vdots & \\ J & \text{if } \mu_{J-1} < y^* \end{cases} \quad (7)$$

where μ represent the threshold values that distinguish the different outcome categories, for which we have $J-1$ values given J categories in total. Since the variance of error (σ^2) and the first threshold value (μ_1) cannot be separately identified from the constant β_0 , σ^2 is standardized to 1 (Greene, 2003). With Φ representing the cumulative distribution function of the standard normal distribution, the probability of belonging to category j , given x , is expressed as:

$$\Pr(y=j|x) = \Phi(\mu_j - x_i' \beta) - \Phi(\mu_{j-1} - x_i' \beta) \quad (8)$$

The marginal effects for the ordered probit model are estimated as:

$$ME_{x_k} = \begin{cases} \frac{\partial P(y=1)}{\partial x_k} = -\phi(\mu_1 - x_i' \beta) \beta_k \\ \frac{\partial P(y=2)}{\partial x_k} = [\phi(\mu_2 - x_i' \beta) - \phi(\mu_1 - x_i' \beta) \beta_k] \\ \vdots \\ \frac{\partial P(y=J)}{\partial x_k} = -\phi(\mu_{J-1} - x_i' \beta) \beta_k \end{cases} \quad (9)$$

Tables 7 and 8 report the results of estimating the likelihood of quadrant membership using the ordered probit model specification. Inspecting the ordered probit results in comparison to the MNL results reported earlier (that is, comparing Tables 5 and 7), we observe that most of

TABLE 7 Ordered Probit estimation of likelihood of belonging to quadrant (marginal effects)

Variables	Quadrant #1 (detrimental health and financial behaviors)		Quadrant #2 or #3 (beneficial health but detrimental financial behaviors or beneficial financial but detrimental health behaviors)		Quadrant #4 (beneficial health and financial behaviors)	
	Marg. eff.	SE	Marg. eff.	SE	Marg. eff.	SE
Female	−0.049	(0.009)***	0.024	(0.012)*	−0.076	(0.016)***
Age 30–39 years	−0.006	(0.014)	0.011	(0.018)	−0.030	(0.023)
Age 40–49 years	0.009	(0.013)	0.035	(0.017)*	−0.066	(0.023)**
Age 50–64 years	−0.081	(0.013)***	0.008	(0.017)	−0.073	(0.022)**
Vocational qualification	−0.030	(0.011)**	0.016	(0.014)	−0.043	(0.019)*
University qualification	−0.127	(0.012)***	−0.046	(0.016)**	−0.030	(0.020)
Personal income (ln)	−0.004	(0.005)	−0.004	(0.007)	0.013	(0.010)
Long work hours	0.025	(0.010)*	−0.012	(0.014)	0.022	(0.018)
Cognitive ability	−0.166	(0.040)***	−0.144	(0.052)**	0.058	(0.069)
Partnered	−0.035	(0.010)**	0.008	(0.013)	−0.051	(0.018)**
Children/dependents	−0.015	(0.009)	−0.033	(0.012)**	0.014	(0.016)
Carer responsibilities	0.017	(0.021)	−0.005	(0.027)	−0.019	(0.037)
Metropolitan location	−0.017	(0.016)	−0.019	(0.019)	−0.006	(0.028)
<i>Coefficients for ordered Probit parameters</i>						
μ_1	0.128	(0.256)				
μ_2	1.362	(0.257)				

Note: Marginal effects computed at the mean of the respective variable. To estimate marginal effects, personality traits have been standardized to take a mean of 0 and *SD* of 1. The full set of coefficients and constant terms are not reported for brevity but are available from the authors. Number of observations: 3752. The estimation uses sociodemographic characteristics observed in 2013, Model criteria: Log likelihood: −3,676.60; LR χ^2 test statistic: 349.42 (13 degrees of freedom); Prob > χ^2 : 0.000; AIC: 7383.20; BIC: 7476.65 (15 degrees of freedom).

Source: Authors' calculations using HILDA Survey.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

the socio-economic and demographic characteristics retain their significance and direction of association. Where there is a notable difference in the coefficient results, we see that university qualifications lose statistical significance in the ordered probit model. This result indicates that higher educational qualifications are important in predicting that an individual belongs in any other quadrant than the consistently detrimental, rather than explaining their progressive transition through the inconsistent and consistently beneficial quadrants. Inspecting the explanatory role of the personality traits as estimated by the ordered probit model in comparison to the MNL as reported before (that is, comparing Tables 6 and 8), we observe that all personality

TABLE 8 Ordered Probit estimation of likelihood of belonging to quadrant with inclusion of personality traits (marginal effects)

Variables	Quadrant #1 (detrimental health and financial behaviors)		Quadrant #2 or #3 (beneficial health but detrimental financial behaviors or beneficial financial but detrimental health behaviors)		Quadrant #4 (beneficial health and financial behaviors)	
	Marg. eff.	SE	Marg. eff.	SE	Marg. eff.	SE
<i>With locus of control</i>						
Female	−0.048	(0.010)***	−0.035	(0.007)***	0.084	(0.016)***
Age 30–39 years	−0.005	(0.014)	−0.004	(0.010)	0.009	(0.024)
Age 40–49 years	0.007	(0.014)	0.005	(0.010)	−0.012	(0.023)
Age 50–64 years	−0.080	(0.014)***	−0.059	(0.010)***	0.139	(0.023)***
Vocational qualification	−0.031	(0.011)**	−0.023	(0.008)**	0.054	(0.019)**
University qualification	−0.127	(0.012)***	−0.092	(0.010)***	0.219	(0.021)***
Personal income (ln)	0.000	(0.006)	0.000	(0.004)	0.000	(0.010)
Long work hours	0.027	(0.011)**	0.020	(0.008)*	−0.047	(0.018)**
Cognitive ability	−0.134	(0.041)**	−0.098	(0.030)**	0.231	(0.070)**
Partnered	−0.040	(0.011)***	−0.029	(0.008)**	0.069	(0.018)***
Children/dependents	−0.011	(0.010)	−0.008	(0.007)	0.018	(0.017)
Carer responsibilities	0.007	(0.021)	0.005	(0.015)	−0.012	(0.036)
Metropolitan location	−0.013	(0.016)	−0.010	(0.012)	0.023	(0.028)
Net internal LOC	−0.028	(0.005)***	−0.021	(0.004)***	0.049	(0.008)***
<i>Coefficients for ordered Probit parameters</i>						
μ_1	−0.123	(0.273)				
μ_2	1.121	(0.274)				
<i>With big five traits</i>						
Female	−0.044	(0.010)***	−0.032	(0.007)***	0.075	(0.017)***
Age 30–39 years	0.005	(0.013)	0.004	(0.010)	−0.009	(0.023)
Age 40–49 years	0.027	(0.013)*	0.020	(0.010)*	−0.046	(0.022)*
Age 50–64 years	−0.056	(0.013)***	−0.041	(0.010)***	0.097	(0.022)***
Vocational qualification	−0.028	(0.011)**	−0.021	(0.008)**	0.049	(0.018)**
University qualification	−0.120	(0.012)***	−0.087	(0.010)***	0.206	(0.020)***
Personal income (ln)	−0.001	(0.005)	−0.001	(0.004)	0.001	(0.009)
Long work hours	0.024	(0.010)*	0.018	(0.007)**	−0.042	(0.017)*
Cognitive ability	−0.134	(0.040)***	−0.097	(0.029)**	0.231	(0.068)**
Partnered	−0.031	(0.010)**	−0.023	(0.008)**	0.054	(0.018)**
Children/dependents	−0.021	(0.009)*	−0.015	(0.007)*	0.036	(0.016)*
Carer responsibilities	0.012	(0.020)	0.009	(0.015)	−0.021	(0.035)
Metropolitan location	−0.020	(0.016)	−0.014	(0.011)	0.034	(0.027)
Agreeableness	−0.004	(0.005)	−0.003	(0.004)	0.007	(0.008)
Conscientiousness	−0.035	(0.005)***	−0.026	(0.004)***	0.061	(0.008)***
Emotional stability	−0.030	(0.005)***	−0.022	(0.004)***	0.052	(0.008)***

TABLE 8 (Continued)

Variables	Quadrant #1 (detrimental health and financial behaviors)		Quadrant #2 or #3 (beneficial health but detrimental financial behaviors or beneficial financial but detrimental health behaviors)		Quadrant #4 (beneficial health and financial behaviors)	
	Marg. eff.	SE	Marg. eff.	SE	Marg. eff.	SE
Extraversion	0.017	(0.005)**	0.012	(0.003)***	−0.029	(0.008)***
Openness to experience	−0.003	(0.005)	−0.002	(0.004)	0.005	(0.008)
<i>Coefficients for ordered Probit parameters</i>						
μ_1	−0.149	(0.259)				
μ_2	1.118	(0.259)				
<i>With achievement motivation</i>						
Female	−0.051	(0.010)***	−0.036	(0.007)***	0.087	(0.016)***
Age 30–39 years	−0.007	(0.014)	−0.005	(0.010)	0.012	(0.023)
Age 40–49 years	0.007	(0.013)	0.005	(0.010)	−0.012	(0.023)
Age 50–64 years	−0.079	(0.013)***	−0.056	(0.010)***	0.135	(0.023)***
Vocational qualification	−0.027	(0.011)*	−0.019	(0.008)*	0.046	(0.019)*
University qualification	−0.125	(0.012)***	−0.089	(0.010)***	0.214	(0.020)***
Personal income (ln)	−0.002	(0.005)	−0.001	(0.004)	0.003	(0.009)
Long work hours	0.029	(0.010)**	0.021	(0.008)**	−0.050	(0.018)**
Cognitive ability	−0.145	(0.040)**	−0.104	(0.029)***	0.249	(0.069)***
Partnered	−0.036	(0.011)**	−0.025	(0.008)**	0.061	(0.018)**
Children/dependents	−0.017	(0.009)*	−0.012	(0.007)	0.029	(0.016)*
Carer responsibilities	0.009	(0.021)	0.006	(0.015)	−0.015	(0.036)
Metropolitan location	−0.011	(0.016)	−0.008	(0.011)	0.019	(0.027)
Hope for success	−0.011	(0.005)*	−0.008	(0.003)**	0.019	(0.008)*
Fear of failure	0.007	(0.005)	0.005	(0.003)	−0.012	(0.008)
<i>Coefficients for ordered Probit parameters</i>						
μ_1	−0.037	(0.266)				
μ_2	1.206	(0.266)				

Note: Marginal effects computed at the mean of the respective variable. To estimate marginal effects, personality traits have been standardized to take a mean of 0 and *SD* of 1. The full set of coefficients and constant terms are not reported for brevity but are available from the authors. Number of observations: LOC model: 3,460; Big Five personality traits model: 3,743; Achievement Motivation model: 3,579. The estimation uses sociodemographic characteristics observed in 2013, LOC variables observed in 2011, Big Five personality traits variables observed in 2013, and Achievement Motivation observed in 2012. Model criteria: With LOC: Log likelihood: −3,355.37; LR χ^2 test statistic: 362.61 (14 degrees of freedom); Prob > χ^2 : 0.000; AIC: 6,742.74; BIC: 6,841.12 (15 degrees of freedom); With Big Five Traits: Log likelihood: −3,593.64; LR χ^2 test statistic: 494.04 (18 degrees of freedom); Prob > χ^2 : 0.000; AIC: 7,227.28; BIC: 7,351.84 (20 degrees of freedom); With Achievement Motivation: Log likelihood: −3,487.27; LR χ^2 test statistic: 346.96 (15 degrees of freedom); Prob > χ^2 : 0.000; AIC: 7,008.54; BIC: 7,113.65 (17 degrees of freedom). *Source:* Authors' calculations using HILDA Survey data.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

variables that predict the likelihood of belonging to the consistently beneficial quadrant, and progressively moving up from the consistently detrimental and inconsistent quadrants, are robust across the MNL and ordered probit specifications.

5 | DISCUSSION OF RESULTS

The results indicate the value and relevance of examining groups of individuals based on the trade-offs or consistency in their behavior across the health and financial management domains. In particular, we find that individuals with beneficial health and beneficial financial management behaviors (the “consistently beneficial”) can be distinguished from individuals with both detrimental health and detrimental financial management behaviors (the “consistently detrimental”), based on some intrinsic aspects of their personality. We find that LOC, the Big Five personality traits, and Achievement Motivation have significant explanatory power in predicting whether individuals belong to the group of the consistently beneficial versus the consistently detrimental, above and beyond the explanatory power of a comprehensive set of socioeconomic and demographic characteristics that could also relate to health and financial management behaviors.

Consistent with prior literature indicating the positive effects of an internal LOC on savings (Cobb-Clark *et al.*, 2016) and health behavior (Cobb-Clark *et al.*, 2014), we find that this aspect of an individual's personality is also associated with a greater likelihood to simultaneously display beneficial health and beneficial financial management behavior. Accordingly, a sense of agency over one's life outcomes is valuable in engaging in beneficial behaviors across different domains of daily decision-making. This finding extends work showing the importance of self-efficacy in individuals' ability to cope with economic risks (Engelberg, 2007), and work showing the importance of individuals' self-assuredness or “self-belief” in their capabilities to explain their engagement in positive financial behaviors (e.g., Farrell *et al.*, 2016; Hoffmann and McNair, 2019).

Our findings also point towards the strong explanatory role of conscientiousness and emotional stability as personality traits driving healthy and financially responsible behaviors. In particular, being more organized and less fretful—facets of conscientiousness and emotional stability—may be important for enabling individuals to maintain self-control in both the health and financial management domains. These insights build on previous literature showing that conscientiousness is associated with positive health behaviors such as exercising and maintaining a good diet (Booth-Kewley and Vickers, 1994) and positive financial behaviors such as saving (Gerhard *et al.*, 2018). In relation to other Big Five traits, we find that extraversion is negatively associated with displaying both beneficial health and beneficial financial management behaviors. Extending the results of Gerhard *et al.* (2018) who found a negative effect of extraversion on savings behavior, our results show the relevance of this personality trait across a broader range of financial management behaviors. These results also extend those of Spielberger and Jacobs (1982) and Benjamin and Wulfert (2005), who found a positive association between extraversion and engaging in detrimental health behaviors such as smoking and heavy drinking, respectively.

Finally, among our results, higher levels of hope for success are associated with a lower likelihood of engaging in both detrimental health and detrimental financial management behaviors, illustrating the relevance of individuals' Achievement Motivation in averting negative life outcomes.

Our results reconcile the opposing perspectives on the dynamics of self-control put forward in previous literature—ego-depletion versus reinforcement—and suggest the validity of both views. For a total of 58% of the sample, we observe that beneficial (detrimental) health behaviors coexist with beneficial (detrimental) financial management behaviors. This result aligns with the reinforcement view that exercising self-control in one domain can strengthen the demonstration of self-control in another domain, or equally, that the deterioration of self-control in one domain could spill over into weaker self-control in another domain. Yet, among the remaining 42% of the sample who constitute the inconsistent cohort, we observe behaviors that could indicate a trade-off in self-control across multiple domains of life. Although we cannot know for sure the reasons for individuals' observed behaviors, this apparent trade-off in behavior is not incompatible with the ego-depletion view of human behavior, according to which exerting self-control in one domain weakens one's capacity to demonstrate self-control in another domain.

The 16% of the sample who appear to exercise relatively weaker self-control across both domains—heightening their susceptibility to harmful health outcomes and precarious financial situations—is the group about which policymakers should be most concerned. Our analysis suggests that these individuals' package of personality characteristics—lower levels of internal LOC, conscientiousness, emotional stability, and hope for success, matched with higher levels of extraversion—could be a recipe for hazardous behaviors, leading to detrimental life outcomes. Moreover, the identification of this at-risk personality profile signals that a “one size fits all” approach to designing support services and incentive campaigns to encourage beneficial behaviors may not be adequately accommodating individuals with this specific personality profile. Instead of treating these traits as a risk factor, policymakers could aim to leverage the ways in which these traits could be used constructively to steer these individuals towards favorable behaviors. Moreover, the detection of consistent patterns of detrimental behavior within a particular segment of our sample is information that can be used to identify the lower boundaries of the effectiveness of proposed intervention strategies. That is to say, attempts to test the effectiveness of potential intervention strategies using an average member of the population could veil the ineffectiveness of the strategy for the at-risk cohort which our results show to possess particular personality traits. At a minimum, when designing new interventions to promote beneficial health or financial management behaviors, it is thus recommended that policy makers undertake pilot testing to assess whether planned policy measures aimed to help this vulnerable segment of society are likely to be effective given its specific personality profile as identified in this study (cf. Haws *et al.*, 2016).

6 | IMPLICATIONS, LIMITATIONS, AND CONCLUSION

6.1 | Implications for policymakers

With the increasing self-responsibility for making consequential financial decisions (van Rooij *et al.*, 2011) and an obesogenic environment (Swinburn *et al.*, 2011), policymakers around the world are looking for ways to stimulate the adoption of healthy lifestyles and financially responsible behaviors (Netemeyer *et al.*, 2018). In this article, we consider whether there are particular personality traits that transcend across multiple domains of an individual's life, influencing the likelihood to simultaneously pursue beneficial, as opposed to detrimental, health and financial management behaviors. Our findings offer insights for policymakers about the likely

effectiveness of different types of intervention strategies designed to incentivize individuals to adopt beneficial behaviors.

Importantly, 16% of our sample displays detrimental behavior across both the health and financial domain, which is a sizeable fraction. Given the negative life outcomes that this group tends to experience and the burden they are more likely to place on the public welfare system, policymakers have reason to focus on trying to steer this cohort of the population towards a healthier lifestyle and more financially responsible behavior. Notably, these consistently detrimental individuals are characterized by particular personality traits, including lower levels of internal LOC, conscientiousness, emotional stability, and hope for success, and higher levels of extraversion.

Greater policy effectiveness may be achieved if policymakers take these intrinsic personality aspects into account when developing interventions to steer this vulnerable cohort of society towards beneficial health and financial management behaviors. While conventional policies have mainly relied on providing (a lot of) factual information to the individual to process and act on, in the following we identify some specific examples of recent policy interventions that may be more effective for this at-risk cohort because they contain elements that also happen to leverage the specific package of personality traits exhibited by members of this group.

Given the relatively high level of extraversion and relatively low level of internal LOC of the consistently detrimental group, a type of policy intervention that is likely to be more effective for this group are campaigns that encourage individuals to socialize, connect with, and draw support from others as a means of averting detrimental behaviors such as smoking or gambling. An example of a policy incorporating such features is the SmokefreeTXT program delivered by the U.S. Department of Health and Human Services (2020). We observe that the text messaging used in this program recognizes that extraversion and low internal LOC can weaken a person's resistance to detrimental behaviors, and recommends actions that steer the individual towards a more "disciplined" environment while also leveraging an extraverted person's preference for social interaction: "Cravings can be triggered by seeing other people smoking. Spend time in places where smoking isn't allowed. Try malls, museums, or the movies." The SmokefreeTXT program also takes into account the potential for at-risk cohorts to possess low levels of hope for success, as is characteristic of the consistently detrimental group in our study. This aspect is reflected by an inbuilt feature in the program that enables participants to receive an on-demand message of support, by sending a keyword such as "Boost" when they are "[...] struggling with a bad mood and need a little help understanding what's bringing you down and how to feel better." Another way for intervention strategies to tap into the high extraversion, and hence strong social connectivity, of the consistently detrimental cohort is reflected in the approach reported in Wood *et al.* (2012) in which individuals are asked to consider and rank their own alcohol consumption vis-à-vis other drinkers. This ranking process is found to subsequently sharpen individuals' own perceptions of developing alcohol-related disorders, potentially incentivizing them to reduce their binge-drinking tendencies.

Combining the relevance of high extraversion and low internal LOC among the consistently detrimental cohort, group-based interventions might be especially effective for these at-risk individuals, as peers can be a source of emotional support and information, fostering individuals' self-efficacy. Incorporating a social component in policy interventions for this at-risk group can also accommodate the fact that these individuals tends to display not only high levels of extraversion, but also low levels of emotional stability (that is, a stronger volatility in emotional state). Research in both health and finance shows that the social pressure of group interventions leads to a higher commitment towards continuing to engage in beneficial behaviors, while

being in a group of similar individuals also provides emotional support (e.g., Bandura, 1998; Gugerty, 2007; Dupas and Robinson, 2013; Peeters *et al.*, 2018). Although we recognize that individuals with severe emotional and mental health issues or even addictions will need more complex, specialized treatment and services, we can look at examples of self-help groups in the health and financial domains that demonstrate aforementioned features. For instance, similar to self-help groups in the health domain which provide both constructive peer pressure and emotional support such as “Alcoholics Anonymous,” recent work shows the effectiveness of “Under-Savers Anonymous” self-help groups in the financial domain (Kast *et al.*, 2018). This example illustrates that the barriers—and potential solutions—to engaging in financially responsible behavior may not be dissimilar to those pertaining to engaging in a healthy lifestyle, affirming the usefulness of looking at these two domains, and the associated trade-offs or consistency in behaviors, simultaneously.

Another key insight from our results is that individuals in the consistently detrimental quadrant are characterized by lower levels of conscientiousness, indicating that this vulnerable segment of society has a tendency to be less orderly, efficient, organized, and systematic than the typical member of society. Interventions that are designed to compensate for an individual's lack of organizational tendencies may thus be particularly relevant, such as the provision of personal trainers to design tailored exercise plans for clients, or the automatic home-delivery of healthy and fresh meals. Moreover, policy makers should consider the recommendation of behavioral economics to simplify the information presented to individuals, using an “opt out” system where the default is the most beneficial option instead of the conventional “opt in” system (Matjasko *et al.*, 2016). Again, this approach would be expected to be beneficial for people in the consistently detrimental group, who are characterized by relatively low conscientiousness. Hence, they have a lower disposition to pay attention to details, and might be less likely to take the time to read through the information needed to identify the most beneficial option for them, and hence more likely to go with the default.

A practical example of a recent policy intervention that could help overcome the low conscientiousness of the consistently detrimental cohort while simultaneously tapping into their higher levels of extraversion is an intervention to improve savings behavior by the financial institution Ariva (2018). In particular, when helping clients prepare their taxes, Ariva presents messages such as “Most people save part of their tax refund. You should too.”, thereby using a positive social norm. At the same time, clients were given the option to simply tick a box to indicate how much of their tax refund they wanted to save and in which account, thus using the power of smart defaults. The option of saving 0% of the tax refund was complemented by the label “highly NOT recommended.” Using such simple defaults helps steer clients towards the most beneficial behavior without relying on individuals to be organized and diligent enough to research this information themselves. Overall, this specific example program leverages the constructive influence of positive social norms, environmental cues, and behavioral nudge techniques (Thaler and Sunstein, 2008).

In sum, the results of this study should prompt policymakers to consider how—for certain individuals—policy interventions could be made more effective by innovating beyond simply presenting individuals with raw information on the benefits of healthy and responsible behavior, and to instead tailor programs to adapt to the full suite of the personality traits that people possess.

6.2 | Limitations and future research

As with any research, our article has some limitations which offer promising avenues for future research. First, the cross-sectional nature of our research means that statistical relationships can only be interpreted as correlations. Based on our analysis with only single years of observations for some health and finance-related behaviors, we cannot make causal claims that particular behaviors *lead* to particular life outcomes. It is also possible that experiencing a particular life outcome, such as ill health or financial impoverishment, feeds back into an individual's behavior. While our results are still informative to policymakers, future research is advised to investigate the longitudinal properties of the data to assess whether individuals transition between the different quadrants over the course of their life, and how this relates to their sociodemographic characteristics and personality traits.

Second, we recognize that the type of behavior that is conducive to a favorable life outcome for an individual in either the health or financial domain can be “active” (i.e., initiating a beneficial behavior) or “passive” (i.e., resisting a detrimental behavior). Our health and financial behavior indices contain a combination of such active and passive behaviors. Although beyond the scope of the present investigation, future research could examine whether distinguishing between active versus passive dimensions of behavior adds further insights of potential benefit for policymakers.

Third, we focused on intrinsic aspects of individuals' personality with demonstrated relevance in explaining health and financial behavior and availability in the HILDA Survey data. We invite future research to examine the role of other psychological factors in explaining the overlap between health and financial behaviors, such as an individual's consideration of future consequences (Joireman *et al.*, 2010) and propensity to plan (Lynch *et al.*, 2010; Xiao and O'Neill, 2018). Moreover, future work could examine the underlying process of our findings, given recent work which finds that personality traits such as agreeableness are related to the importance one places on money, which again explains experiencing economic hardship (Matz and Gladstone, 2018).

Finally, we have studied a sample of employed, working-age Australians. There is scope to expand this analysis to also consider the circumstances of individuals who are either unemployed or not engaged in the labor force, for whom a different set of policy responses could be required. Moreover, despite Australia being similar in its institutional environment and national culture to many other developed nations, we encourage further research using data sets from other countries to further establish the generalizability of our research findings.

7 | CONCLUSION

Recent work suggests that psychological variables can offer novel insights to guide policy interventions, such as in the context of poverty alleviation (e.g., Haushofer and Fehr, 2014) and when supporting financially vulnerable individuals (Hoffmann and McNair, 2019). Furthermore, policymakers in the U.S. (CFPB, 2013) as well as the U.K. (Money Advice Service, 2015) stress the role of psychological characteristics in better understanding individuals' financial capability. At the same time, various studies point towards the relevance of psychological factors in understanding health behaviors as related to, for example, exercise (DellaVigna and Malmendier, 2006), overeating (Strien *et al.*, 2009), and smoking or drinking (Zuckerman and Michael Kuhlman, 2000).

Policymakers could gain richer insights into the design and evaluation of the prospective effectiveness of interventions by recognizing that the perceived barriers to engaging in beneficial behavior are similar across the health and financial domains, in terms of entailing short-term sacrifices to obtain uncertain long-term benefits, and requiring the exercise of self-control. Accordingly, it is useful to examine the potential simultaneity in individuals' health and financial management behaviors and identify the intrinsic personality characteristics of individuals that may empirically explain these observed patterns in behavior across these two different domains.

In this article, we find that many individuals show simultaneity in their health and financial behaviors, in terms of behaving in either a consistently beneficial or consistently detrimental way across these two domains. Underlining the relevance of our approach, we show that these behaviors are associated with fundamental life outcomes, including physical and mental health, financial prosperity, and life satisfaction. Exploiting the rich set of psychological variables in the HILDA Survey data, we find that individuals' personality traits have a statistically significant role in predicting the simultaneous pursuit of a healthy lifestyle and financially responsible behavior. Our findings highlight that individuals who tend to struggle in both their health and financial management behaviors are characterized by high extraversion, as well as low LOC, hope for success, conscientiousness, and emotional stability. Our findings offer insights for policymakers about how to potentially adapt their future intervention strategies to match the personality of those they are trying to help.

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ENDNOTES

¹ Relevant examples from Australia include the "MoneySmart" initiative website run by the Australian Government's Australian Securities and Investments Commission (<https://www.moneysmart.gov.au/managing-your-money>), the Australian Government's "Eat For Health" website and resources (<https://www.eatforhealth.gov.au>), the Australian Government alcohol consumption guidelines (<http://www.alcohol.gov.au/internet/alcohol/publishing.nsf/Content/guide-adult>), the Australian Government's "Quit Now" website and resources (<http://www.quitnow.gov.au/internet/quitnow/publishing.nsf/Content/home>), and the "Gambling Responsibly" support services funded by the Australian, State and Territories Governments (<https://www.gamblinghelponline.org.au/making-a-change/gambling-responsibly>). Similar initiatives exist in the U.S., Canada, and Europe. Relevant examples in the financial domain include the "Consumer Financial Protection Bureau" website run by the U.S. government (<https://www.consumerfinance.gov>), the "Financial Consumer Agency of Canada" website run by the Canadian government, the "Money Advice Service" website run by the U.K. government (<https://www.moneyadviceservice.org.uk/en>), and the "Money Wise Platform" website run by the Dutch Government (<https://www.wijzeringeldzaken.nl/english/>).

- ² For a bibliography of studies that use the HILDA Survey, see <https://melbourneinstitute.unimelb.edu.au/hilda/publications>.
- ³ The Australian retirement savings scheme is known as superannuation (Foster *et al.*, 2015), which legally requires employers to make compulsory contributions on behalf of their employee into an employee's nominated retirement savings account. Core to our analysis of individuals' savings habits, employees can also make regular voluntary contributions into this superannuation account, which cannot be accessed until retirement age. In this regard, superannuation is similar to the Individual Retirement Accounts (IRAs) and 401(k) plans in the United States.
- ⁴ For robustness, we conduct a comparative analysis with a sample of individuals who have had at least one spell of non-employment during the 3 years and exclude superannuation contributions from the financial behavior index. The results are similar to those reported here (including significance levels), and are available upon request.
- ⁵ We confirm that the estimation sample of 3,752 individuals is not different from the total sample of 4,285 individuals in terms of the sociodemographic characteristics, health and financial management behaviors, and personality trait scores. We do not find statistically significant differences in mean values for any of these variables between these two samples.
- ⁶ $\alpha = .83$ for locus of control; $\alpha = .78$ for agreeableness; $\alpha = .79$ for conscientiousness; $\alpha = .79$ for emotional stability; $\alpha = .80$ for extraversion; $\alpha = .71$ for openness to experience; $\alpha = .75$ for hope for success; and $\alpha = .83$ for fear of failure.
- ⁷ The interdeterminacy of the model is removed by normalization of the parameter $\beta_0 = 0$ (Greene, 2003).
- ⁸ We apply Bonferroni multiple comparison corrections when comparing the Big Five personality trait dimensions.
- ⁹ We ran the same regression using socioeconomic and demographic characteristics for the individual collected in 2014 and 2015, which are the years from which some of the financial management behavioral indicators are drawn. The level of significance and the direction of the coefficients of our explanatory variables remain largely unchanged.

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