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OCEAN wealth profiles: A latent profile analysis of personality traits and financial outcomes

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ABSTRACT

There is a growing interest in the role of personality characteristics in describing financial outcomes. The Big Five personality traits have been shown to predict relevant financial outcomes including income and net worth. In the present research ($n = 395$), we move beyond individual Big Five personality traits to look at personality profiles in the prediction of financial outcomes. Using latent profile analyses, we identified three profiles—*Under Controlled*, *Resilient*, and *Over Controlled*—which were uniquely associated with income, risk tolerance, and life satisfaction. These patterns held even after controlling for gender, education, and age. The discussion focuses on the relative benefits of a personality approach over the common risk-tolerance approach.

1. Introduction

Results from ongoing surveys suggest that Americans worry about having enough money today and in the future (APA, 2018). This worry is well justified in that households are called upon, to an ever-greater extent, to take full responsibility for their financial futures compared to past generations (U.S. Bureau of Labor Statistics, 2020). Ongoing financial stress coupled with the realization that few social safety nets exist for those who accumulate inadequate wealth point to the need to better understand the predisposing personality factors associated with wealth. Personality traits influence a range of behaviors, including financial decisions that impact the accumulation and management of household wealth (Costa & McCrae, 1992a). These traits have been shown to correlate with a host of financial variables, notably wealth (Duckworth et al., 2012; Exley et al., 2021; Seay & Nabeshima, 2015). Specifically, individuals who exhibit higher conscientiousness tend to hold more wealth, whereas individuals who demonstrate higher neuroticism have less. Similar patterns are found across related financial variables, like income and financial risk-tolerance, the latter of which is of central importance because its measurement is required by securities regulators.

Neither risk-tolerance nor personality traits exist in isolation. Personality traits have been shown to organize in higher level patterns or profiles (Donnelly et al., 2012; Kinnunen et al., 2012; Merz & Roesch,

2011). While research on the association between individual personality traits and wealth is sparse, no known research exists on identifying profiles of personality traits and wealth and related financial variables.

The remainder of this manuscript is structured as follows. First, we introduce the Big Five model and the financial outcome variables most often used in financial research—financial risk taking, income, net worth, and life satisfaction or “happiness”. We then provide a brief explanation of the methodological approach taken in this study: latent profile analysis (LPA). Next, we describe the results from the LPA and explore how these results are associated with financial outcomes. The paper ends with a discussion of the results with a focus on providing relevant implications for researchers and those who provide financial advice.

1.1. Personality

McAdams and Pals (2006, p. 204) defined personality as “...an individual's unique variation on the general evolutionary design for human nature, expressed as a developing pattern of dispositional traits, characteristic adaptations, and integrative life stories, complexly and differently situated in culture.” Our focus in this study is on dispositional traits. The Five Factor Model (FFM) or Big Five (Costa & McCrae, 1992a; Digman, 1990; Goldberg, 1993; John & Srivastava, 1999) divides personality into five traits: openness, conscientiousness, extraversion,

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agreeableness, and neuroticism (O.C.E.A.N).

1.2. Financial risk tolerance

Financial risk tolerance is defined as one's willingness to risk losing money for the possibility of higher gains (Grable & Joo, 2004). Some researchers argue that someone's willingness to take risk is akin to a personality trait (Hartnett et al., 2019), whereas others believe that risk tolerance is more variable and dependent on the context in which a decision is made (Rabbani et al., 2017).

We include financial risk-tolerance as an outcome for theoretical and practical reasons. There is a legal mandate in the financial services profession that risk tolerance be assessed before investment advice is provided to another person for a fee. Even though this mandate has its roots in law rather than science (US SEC, 2019), the risk-profile questionnaire has become a tool used by nearly every financial services professional. Additionally, there is evidence to suggest that personality traits explain a person's willingness to take financial risks. The trait of extraversion has been shown to correlate with higher financial risk tolerance (Exley et al., 2021; Seidor, 2018), while neuroticism has been found to correlate with lower levels of financial risk tolerance (Mayfield et al., 2008; Seidor, 2018). Openness has also been found to correlate with greater financial risk tolerance while agreeableness is known to negatively predict stock ownership (Buccioli & Zarri, 2017). In a recent study, Exley et al. (2021) found conscientiousness to have a negative relationship with financial risk tolerance.

1.3. Income

Income is defined as the inflow of financial resources into a household at a given point in time (Oliver & Shapiro, 1990). Income is one of the primary financial outcome variables of interest in psychological research, particularly among those researchers interested in income inequality. The research on personality and income has shown that aspects of the Big Five predict income (Borghans et al., 2008). In their seminal study, Judge et al. (1999) observed significant correlations between income and conscientiousness (0.34), neuroticism (−0.32), and extraversion (0.24). While conscientiousness, extraversion, and neuroticism have been shown to produce the most reliable correlations with income, openness exhibits weak positive correlations with income; agreeableness shows a slightly negative correlation with income.

1.4. Wealth

The simplest definition of wealth is assets minus liabilities. Wealth represents an accumulation of resources and is typically measured by net worth (Killewald et al., 2017; Oliver & Shapiro, 1990). Although related, income and net worth are separate constructs (Stanley, 2013). Whereas income tends to be more volatile over short periods, wealth is more stable and offers a robust indication of economic well-being (Oliver & Shapiro, 2006). Wealth can be measured at the household or individual level. This study focuses on individual net worth.

Duckworth et al. (2012) found that openness, conscientiousness, and extraversion are positively associated and neuroticism is negatively associated with net worth. Seay and Nabeshima (2015) also found that extraversion and conscientiousness are positively associated with net worth, whereas agreeableness is negatively associated with net worth. Letkiewicz and Fox (2014) and Motika (2019) both reported that conscientiousness has a significant positive relationship with wealth. Most recently, Exley et al. (2021) found conscientiousness to have a positive relationship with wealth and neuroticism to have a negative relationship with an individual's wealth.

1.5. Happiness

Financial success—the ability to meet one's financial needs—is an

important component of subjective well-being (Diener et al., 1985). Ng and Diener's (2014) meta-analysis found a 0.45 correlation between financial satisfaction and life evaluation, which was the highest correlation of all the life satisfaction domains. Above certain levels, increased income has diminishing returns for happiness (Easterlin, 1995; Kahneman & Deaton, 2010). Our interest in this study lies in whether certain profiles of personality traits are associated with self-reports of happiness.

1.6. Latent profile analysis

Evaluating the bivariate effects of personality on financial outcomes is a straight-forward way to evaluate how personality is related to wealth. However, traits compete for shared variance (Costa & McCrae, 1992a; DeYoung et al., 2002; Digman, 1997) when making predictions about future outcomes. The sharing of variance has the potentiality of hiding overlaps across traits (Merz & Roesch, 2011). Therefore, the combinations of the big five traits may be important in understanding wealth accumulation attitudes and behaviors and wealth status.

Measuring higher-order interactions across the five personality traits simultaneously would be an alternative approach to evaluating combinations. However, this approach can lead to reduced statistical power and increased variance inflation (Merz & Roesch, 2011). A latent profile analysis (LPA) offers a way to use a person-centered approach that can be used to model higher-order interactions (Lanza et al., 2010). Organizing trait clusters into profiles is helpful in that it offers a brief simple summary of complicated relationships (Herzberg & Roth, 2006; Robins et al., 1996). In this study, we follow recently published guidelines from Ferguson and colleagues (2020) for conducting and reporting the current LPA.

Researchers employing LPA approaches typically find between three (Asendorpf et al., 2001; Merz & Roesch, 2011; Rammstedt et al., 2004) and five personality profiles (Herzberg & Roth, 2006; Kinnunen et al., 2012; Zhang et al., 2015). A recent systematic review of FFM LPA approaches found a robust history of three profile solutions; across all included studies, researchers identified a profile marked by elevated scores in openness, conscientiousness, extraversion, and agreeableness as well as markedly low neuroticism scores (Yin et al., 2021). This profile is similar to the “Big One” personality structure that is consistently associated with well-being, life satisfaction, self-esteem, and other desirable individual differences (Museum, 2007).

1.7. Hypotheses

This study was designed to use LPA to explore interactions with personality traits in order to predict financial outcomes. In this regard, the following hypotheses were tested:

- H1.** : Big Five Personality will form at least three latent profiles.
- H2.** : Latent personality profiles will differentially predict (a) financial risk tolerance, (b) income, (c) wealth, and (d) happiness.
- H3.** : A “Big One” profile will be identified and be positively associated with financial outcomes as well as happiness.

2. Method

2.1. Sample

The sample ($N = 584$) was recruited through Amazon's Mechanical Turk (MTurk). Responses to the personality measure were evaluated using the R package *careless* (Yentes & Wilhelm, 2018) to identify potential careless responding. First, the *longstring()* function was run on responses to the personality measure; of the 60 items, the mean longest length of same response options chosen in a row was 5.63 ($SD = 3.69$). Next, all responses exceeding a length of the mean plus one standard

deviation (9.32) were removed ($n = 179$). An additional eight participants were removed for not completing the income and net worth measures. Finally, we excluded two participants who reported a net worth greater than \$5,000,000 under the assumption that it is unlikely that someone with that high of a net worth would be completing Mturk tasks. The final data analytic sample includes 395 participants.

Participants were U.S. citizens over the age of 21. Those who completed the MTurk survey were compensated \$1 for their time (the survey took approximately 25 min to complete). The sample included 178 females (45%), 190 with a Bachelor's degree (48%), and 212 (54%) who were married. Participants averaged about 37 years old ($M = 36.81$ years, $SD = 11.22$ years). Sixty eight percent of participants identified as White, whereas 22% identified as African-American/Black, 5% as Asian, and 4% as Hispanic/Latino/Latinx. The median income among those in the sample was \$40,000 ($M = \$45,326$, $SD = \$39,342$), which was close to the national 2019 median of \$41,537. The average net worth of participants was \$25,000 ($M = \$116,904$, $SD = \$253,385$), which was much lower than the median of \$104,000 at the time of the study. Means, standard deviations, and alphas (where appropriate) are reported in Table 1.

2.2. Measures

Personality was measured with the NEO-IPIP 60 (Maples-Keller et al., 2019), which provides a valid and reliable indication of a person's Big Five personality traits. The NEO-IPIP 60 is a sixty-item questionnaire using a five-point Likert scale. Each of the five traits is measured with 12 questions.

Financial risk tolerance was measured using a propensity measure developed by Grable and Lytton (1999). This measure of risk tolerance is a 13-item questionnaire. Scores are summed such that higher scores indicate a greater willingness to take financial risk and range from 13 to 41. Income was assessed by asking, "What was your total income before taxes during the past 12 months?" Net worth was evaluated with the following question: "Net Worth is the total of your assets such as a home or retirement account, less liabilities such as student loans or mortgages. What is your net worth?"

Happiness was measured with the Satisfaction with Life Scale (Diener et al., 1985). This scale is comprised of five items that measure global life satisfaction. Responses range between 1 and 7 and are averaged such that higher scores indicate more life satisfaction.

3. Results

Results from the tests are presented as follows. First, we include the descriptive statistics. This is followed by a description of the LPA. Finally, we show the results of linking LPA profiles to financial outcomes.

3.1. Latent profile analysis

The package *mclust* was used to identify clusters of personality traits based on the Big Five (Scrucca et al., 2016). The analysis indicated that a three-group solution was the best fit for the data (based on BIC criterion). Bootstrapped LRT values with 999 replications confirmed the three-group solution was the best fit. The three-group solution was found to be superior to a two-group solution (two versus three LRTS = 78.46, $p = .001$). Though the model fit improved with the addition of a fourth group (three versus four LRTS = 39.17, $p = .01$), additional groups both reduced BIC and increased LRTS so a three-group solution was maintained (Ferguson et al., 2020). Results are plotted in Fig. 1. Means and standard deviations for each profile are shown in Table 2.

As shown in Fig. 1 and Table 1, participants clustered into the following three distinct groups closely resembling those found by Robins et al. (1996). We adopted their naming conventions:

Profile 1 ($n = 79$, 20.00%), labelled *undercontrolled*, was characterized by moderately-low openness and agreeableness, moderate conscientiousness, and high extraversion.

Profile 2 ($n = 101$, 25.57% of the sample) was characterized by high levels of conscientiousness and agreeableness, moderate openness and extraversion, and markedly low neuroticism. This profile was labelled *resilient*.

Profile 3 ($n = 215$, 54.43%), referred to as *overcontrolled*, was characterized by low extraversion and moderate/high openness, conscientiousness, agreeableness, and elevated neuroticism.

3.2. Validation analysis: association of latent profiles with financial outcomes

Based on Ferguson and colleagues' (2020) recommendations for covariate exploration of LPA groups, the total entropy of the model was calculated; the value of the three-group solution, 0.89, exceeded the suggested cutoff of 0.80 for assigning participants to groups based on highest posterior probability (Clark & Muthén, 2009). The *mclust* package (Scrucca et al., 2016) was used to assign participants to one of the three LPA groups.

Separate ANOVA models were estimated to determine the extent to which LPA groups were associated with the financial outcomes, controlling for gender, education, and age.¹ LPA groups explained a significant amount of variance in each of the outcomes except for net worth. Table 3 shows the ANOVA baseline and hypothesized models.

Differences between groups for income, risk tolerance, and happiness were then examined using Tukey's post-hoc tests, which were run on the full control + LPA models. Results are reported in Table 4 with 95% CI for differences between groups (Figs. 2-5).

4. Discussion

This study used LPA to identify groups of individuals with similar personality profiles. Three profiles emerged and were informative regarding each group's risk tolerance, income, net worth, and happiness.

The largest group, those closest to *overcontrolled* (Robins et al., 1996), scored relatively high on conscientiousness and agreeableness. Those in this group had the lowest extraversion scores. No differences in income, compared to the other groups, were noted, but this group did exhibit significantly lower risk tolerance as well as lower overall life satisfaction.

The next largest group strongly resembled the *resilient* or Big One personality—high on all traits except for neuroticism. This group exhibited the highest income (significantly higher than the *undercontrolled* group), a moderate amount of risk tolerance, and high satisfaction with life.

Finally, the *undercontrolled* group had the highest levels of extraversion and neuroticism and the lowest openness, conscientiousness, and agreeableness scores. They reported earning significantly less than their *resilient* peers, with the most varied net worth ($SD = \$30,884.30$), have similarly high satisfaction with life scores as their *resilient* peers, and, most notably, had significantly higher tolerance for risk than those in the other groups.

5. Implications

The profile analyses presented in this paper advance the personality psychology and household finance literature in meaningful ways.

¹ Age was excluded from the wealth model because of potential multicollinearity effects. Age is associated with the time value of money and wealth accumulation. While we did run a model in which age was included as a predictor, the correlation ($r = 0.26$, $p < .0001$) left little variance to be explained by the other independent variables in the model.

Table 1
Variable descriptive statistics.

	O	C	E	A	N	Risk	Income	Net worth	Happiness
Alpha	0.65	0.83	0.86	0.77	0.85	0.71	–	–	0.99
Mean	3.33	3.78	3.32	3.66	2.67	25.20	\$ 45,326	\$ 116,904	4.77
SD	0.57	0.64	0.71	0.61	0.77	4.92	\$ 39,342	\$ 253,385	1.53



Fig. 1. Results of the LPA.

Table 2
LPA group means.

Group	n (%)	O	C	E	A	N
Total	395 (100%)	3.34 (0.57)	3.79 (0.64)	3.32 (0.71)	3.676 (0.61)	2.67 (0.77)
Profile 1	79 (20.00%)	2.91 (0.24)	3.09 (0.23)	3.78 (0.38)	3.00 (0.21)	3.29 (0.26)
Profile 2	101 (25.57%)	3.62 (0.44)	4.45 (0.35)	3.77 (0.47)	4.05 (0.35)	1.74 (0.38)
Profile 3	215 (54.43%)	3.36 (0.61)	3.72 (0.54)	2.94 (0.63)	3.72 (0.62)	2.88 (0.63)

Table 3
ANOVA results.

Outcome	Model	Omnibus F	Adj R ²	F change
Income	Controls	3.77***	0.06	
	+LPA	3.69***	0.07	3.28*
Net worth	Controls ¹	5.05***	0.08**	
	+LPA	4.19***	0.07	0.77
Risk tolerance	Controls	7.84***	0.14	
	+LPA	10.82***	0.22	20.63***
Happiness	Controls	4.63***	0.08	
	+LPA	10.08***	0.20	31.29***

Notes: ¹Age was excluded from the wealth model because of potential multicollinearity effects. Age is associated with the time value of money and wealth accumulation. While we did run a model in which age was included as a predictor the correlation ($r = .26, p < .0001$) left little variance to be explained by the other independent variables in the model.

* $p < .05$.
** $p < .01$.
*** $p < .001$.

Resilients seem to be “well-adjusted” financially, but may need a “nudge” (Thaler & Sunstein, 2008) toward more risky assets as a way to grow wealth. *Overcontrolled* individuals may also benefit from taking more financial risk as they build wealth. As the least happy of the three profiles, helping *overcontrolled* individuals celebrate their financial accomplishments may also be important. *Undercontrolled* individuals may need emotional comforting during the highs and lows of investing and may have trouble staying invested during turbulent markets. Assisting

undercontrolleds in dialing back their financial risk may be a pathway to preventing them from needlessly losing money as they seek to build wealth.

Future research on wealth profiles should include studies on solutions that improve financial behaviors and outcomes. More than ever, Americans are increasingly being asked to take more responsibility for their own retirement and financial future. In 1960, roughly half of the U. S. population had a pension plan (Edelman, 2014). Today, only 18% of Americans are eligible for a defined benefit pension (U.S. Bureau of Labor and Statistics, 2020). The primary responsibility for preparing for retirement has been removed from the employer and placed on employees. For example, as shown in this study, highly extraverted individuals—when coupled with low agreeableness and impulsiveness—take more financial risk but do not convert their risk taking into a higher net worth (Exley et al., 2021). Interventions aimed at reducing impulsiveness and adding financial discipline may be useful for individuals with this profile.

This research also has implications for the financial services profession where there is a legal mandate that risk-tolerance be assessed before a financial services professional can provide investment advice to a client (US Department of Labor, 1974, 2017). Because of this mandate, the financial risk-tolerance questionnaire has become the primary way in which the willingness of investors is gauged. However, as indicated in this study, risk-tolerance scale scores may not provide a complete picture of someone’s likelihood of taking an appropriate level of risk. Risk tolerance has been shown to be somewhat elastic and changeable (Grable et al., 2004) and somewhat easy to manipulate (Thaler & Johnson, 1990). Future research should explore if personality traits might offer clues into the elasticity of financial risk tolerance (Judge et al., 2014).

5.1. Limitations

Limitations of the current study include the use of a moderately-sized convenience sample that was asked to self-report attitudes, feelings, and dollar amounts as outcome variables. While personality is known to be consistent across samples (Costa & McCrae, 1992b; Digman, 1997; Goldberg, 1993; John & Srivastava, 1999), a replication of this study using a sample of high-net-worth individuals would be useful in validating study findings.

6. Conclusion

This study sought to explore and test if there are naturally occurring patterns of the Big Five personality traits using LPA. Three profiles emerged from the analysis that mirrored findings from similar studies. These profiles were found to describe distinct financial outcome patterns related to financial risk tolerance, income, and happiness.

CRedit authorship contribution statement

Jim Exley: Conceptualization, Resources, Investigation, Writing – original draft, Project administration. **Patrick C. Doyle:** Methodology, Formal analysis, Data curation, Visualization. **John Grable:** Writing – review & editing. **W. Keith Campbell:** Conceptualization, Supervision, Writing – review & editing.

Table 4
Orthogonal contrasts.

Outcome	Comparison	Difference	Lower CI	Upper CI
Income	Resilient to undercontrolled	13,490.33*	79.45	26,901.21
	Overcontrolled to undercontrolled	8,999.90	-2,847.35	20,647.15
	Overcontrolled to resilient	-4,590.43	-15,361.50	6180.64
Risk tolerance	Resilient to undercontrolled	-1.63*	-3.17	-0.09
	Overcontrolled to undercontrolled	-3.30***	-4.65	-1.95
	Overcontrolled to resilient	-1.67**	-2.91	-0.43
Happiness	Resilient to undercontrolled	-0.05	-0.53	0.43
	Overcontrolled to undercontrolled	-1.07***	-1.49	-0.64
	Overcontrolled to resilient	-1.02***	-1.41	-0.63

Notes:
 * p (adjusted) < 0.05.
 ** p (adjusted) < 0.01.
 *** p (adjusted) < 0.001.

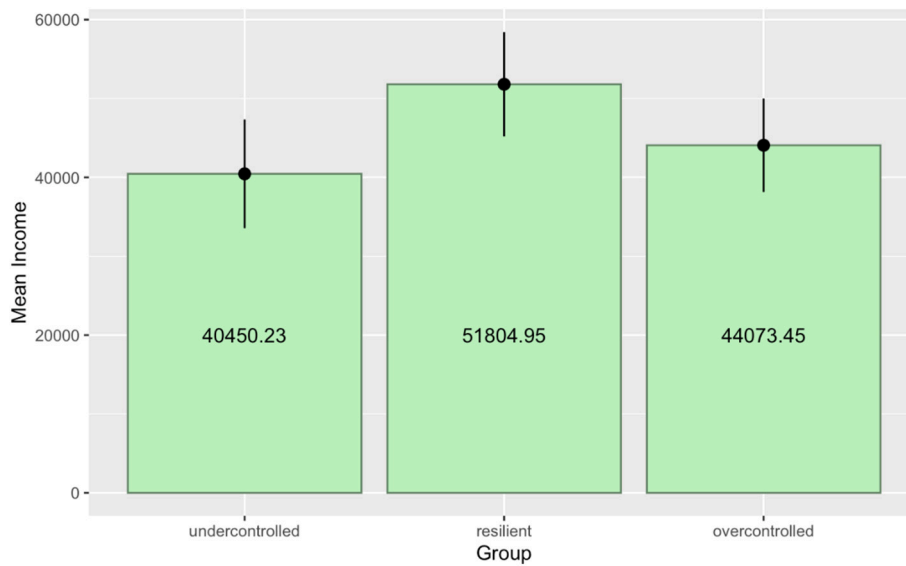


Fig. 2. Mean income plotted by LPA group.

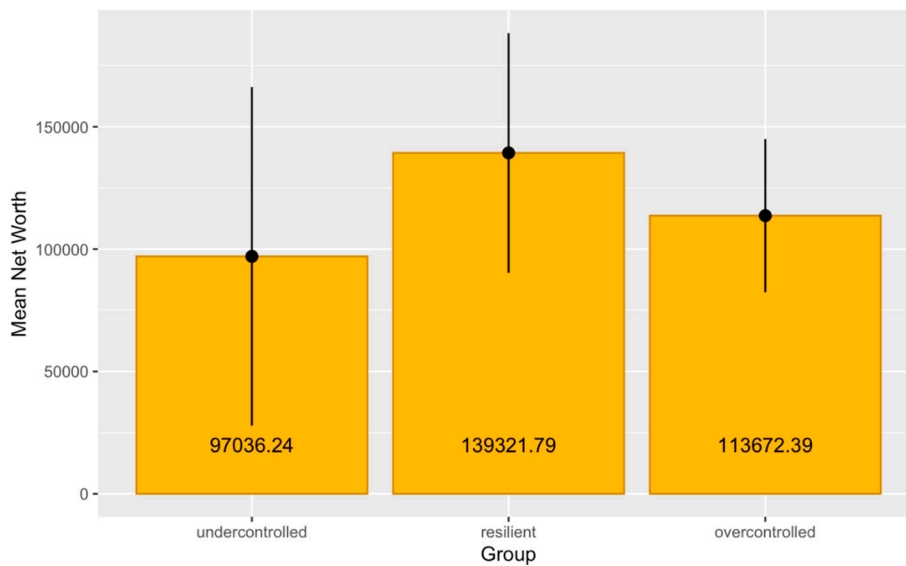


Fig. 3. Mean net worth plotted by LPA group.

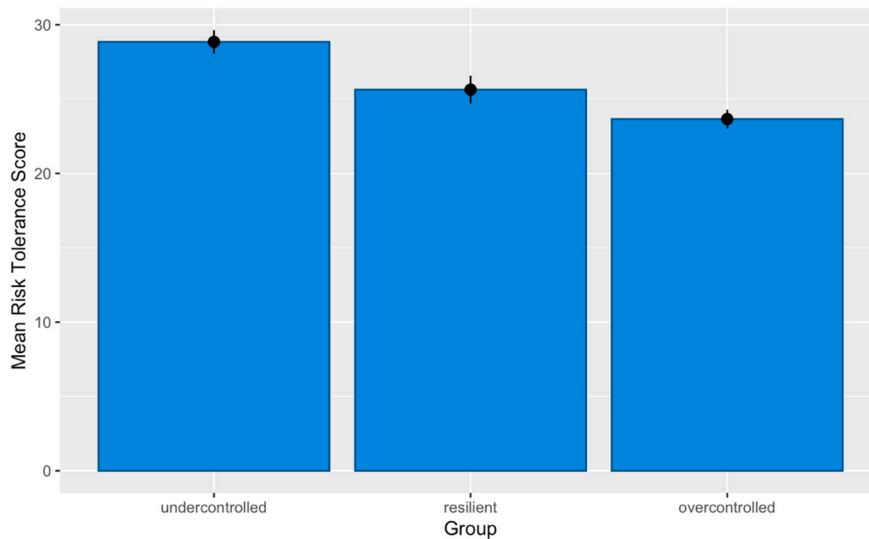


Fig. 4. Mean risk tolerance plotted by LPA group.

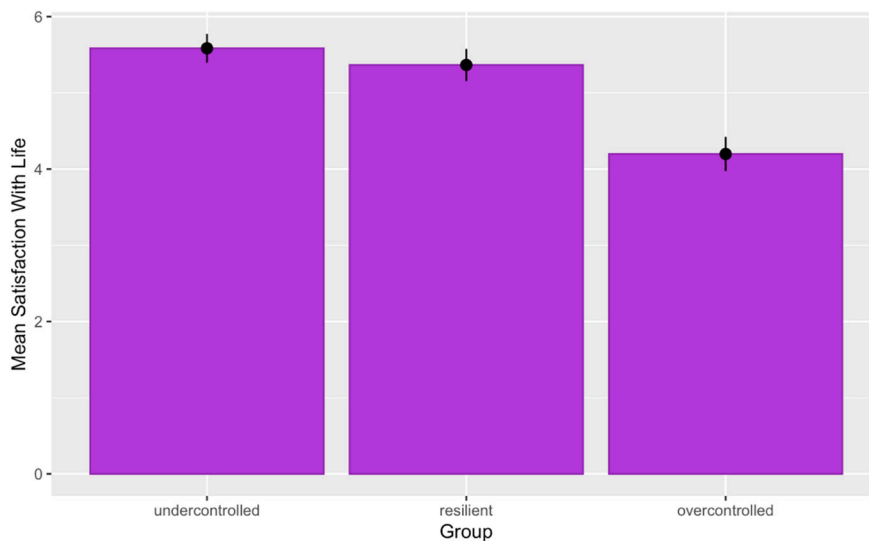


Fig. 5. Mean life satisfaction plotted by LPA group.

Declaration of competing interest

Jim Exley, in addition to being a PhD student at the University of Georgia, is a practicing CFP and the President of Owner Strategies that uses personality to measure and modify individual financial behaviors.

John Grable is a member of the advisory board for Data Points, a company that utilizes measures of personality to understand financial behavior.

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