THE JOURNAL OF
INVESTMENT CONSULTING

A reprinted article from Volume 20, Number 1, 2020

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INVESTMENTS & WEALTH INSTITUTE®

VOLUME 20
NUMBER 1
2020

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ABSTRACT

We extend the work of Pan and Statman (2013) by investigating correlations between personality traits and risk tolerance among emerging adults. We score respondents on the Big Five personality traits: extraversion, agreeableness, conscientiousness, neuroticism, and openness. We then analyze correlations between these traits and reported characteristics of risk tolerance: overconfidence, maximization, regret, trust, life satisfaction, and the propensity to attribute success to luck over skill. We find correlations that describe relationships between conscientiousness and the propensity to attribute success to luck over skill, as well as a lack of overconfidence; between openness and the propensity for maximization; and between neuroticism and the propensity for overconfidence. We underscore the nuanced dimensions of investor preferences. We discuss neuroticism and its effects on self-reporting in the context of risk assessment and financial consulting.

INTRODUCTION

Assessing risk tolerance is a necessary part of portfolio construction. However, there is a well-documented disconnect between an investor's tolerance for risk and the output from risk assessment surveys. Many surveys of risk tolerance neglect important nuances in investor preferences, including investor propensities such as overconfidence, trust, and the attribution of success to luck versus skill (Pan and Statman 2013). If financial consultants were aware of these often-overlooked nuances in investors' risk propensities, they would be better equipped to customize portfolios to meet the needs of their clients. For instance, when a consultant knows a client is inclined by personality to prize upside potential, the consultant can create a portfolio offering a chance, albeit minimal, for skewed gains. Conversely, if an advisor is aware that a client has a personality associated with a propensity for particularly high levels of regret and low levels of risk tolerance, the advisor can offer better downside protection in a more stable portfolio.

The financial crisis in 2008 revealed that common questionnaires about risk tolerance fail to capture the full scope of investors' portfolio preferences. In 2007, investors who indicated high levels of risk tolerance were assigned equity-heavy portfolios, and many of them ended up walking away from both their advisors and their investments. These traditional risk questionnaires fail because they generalize nuanced risk tolerance into an aggregated risk score, which leads to misguided asset allocation and a misunderstanding of crucial investor propensities. Understanding how personality predicts investment propensities provides a mechanism for consultants to bolster client satisfaction, which often is inhibited by imprecise or biased assessments and inaccurate assumptions (Pan and Statman 2012).

If financial consultants were aware of these often-overlooked nuances in investors' risk propensities, they would be better equipped to customize portfolios to meet the needs of their clients.

Traditional assessments of risk preferences often oversimplify the nuanced concept of risk tolerance. Following Pan and Statman (2012), this paper seeks to validate the hypothesis that providing more-detailed questionnaires using situational queries along with personality-type assessment can lead to a more robust understanding of investor risk tolerance. We extend previous work by providing cross-verification of the personality inventory and by extending the analysis to a younger audience. In our analysis, we find connections between both demographic variables and personality traits that can better guide the financial consulting and management industry.

Using questions similar to those developed by Pan and Statman (2013), we developed a personality and risk assessment to address the relationships between the Big Five personality traits (e.g., extraversion, agreeableness) and propensities that

influence risk tolerance, (e.g., maximization, overconfidence). Following the findings of Pan and Statman, we hypothesized there would be significant relationships between personality traits and risk variables, and we believed changing the population sample from a group of investors to a group of emerging adults might validate the findings of Pan and Statman (2013) among a different age demographic.

PITFALLS OF TRADITIONAL RISK SURVEYS

Traditional surveys of risk often fall short by either oversimplifying nuanced investor preferences or by inaccurately measuring risk sentiment altogether. Yook and Everett (2003) acknowledge the inconsistency and variation inherent in risk surveys. Their study showed how different questionnaires produced conflicting risk evaluations for the same set of investors. That is, multiple risk assessments were likely to generate conflicting results for an individual investor. As a result, we conclude risk questionnaires that exclude measures of personality fail to wholly and accurately assess investor risk tolerance.

In part, the variation among questionnaire assessments may be due to the psychological effect that risk questionnaires have on investors. Lucarelli et al. (2015) argue that when individuals are asked to self-assess risk tolerance, they often inaccurately gauge their individual risk preferences. Lucarelli et al. (2015) estimate the inaccuracy of simple risk assessments via questionnaires can lead as many as 65 percent of individuals to misclassify themselves. The self-assessment barrier for risk questionnaires is alarming, because risk surveys guide asset managers in meeting client needs. We seek to overcome this self-assessment barrier by including situational questions in our survey. These situational questions provide a mechanism for evaluating investor sentiment without asking for self-reported risk preferences.

Pan and Statman (2012) concur with general risk questionnaire shortcomings and discuss five main deficiencies:

1. First, investor questionnaires fail to capture the full spectrum of risk tolerances. Traditional assessments probe for a single, aggregate risk score that overlooks the various components of risk.
2. Second, investor questionnaire outputs often involve a score, which provides little guidance to money managers about how to implement the score when allocating the client's assets.
3. Third, traditional surveys fail to capture changes in investor sentiment based on circumstantial factors.
4. Fourth, surveys fail to consider how risk changes with hindsight and foresight.
5. Finally, many surveys fail to include other investor propensities that matter in financial decision-making.

We seek to overcome these barriers by taking a holistic approach to investor risk propensities. Specifically, we avoid these five pitfalls by presenting both situational questions and self-assessment questions, as well as including various investor propensity questions. The beta-tested version of our instrument is available in appendix A.

TRADITIONAL QUESTIONNAIRES LACK NECESSARY COMPLEXITY

As investor decisions become more complex, investment surveys ought to also increase in complexity. Traditional investment surveys are unable to provide comprehensive representation of investor personalities. Filbeck et al. (2005) underscore the increasing importance of understanding behavioral factors involved in investment decision-making. The drastic increase in the number and type of investment vehicles available to typical investors supports the need for increased study of the influence of behavioral factors among investors. For instance, during 1990–2003 the number of available mutual funds grew from 3,081 to 8,126. Concomitantly, the collective value of these funds increased by nearly seven times to $47.41 trillion (Filbeck et al. 2005). Given the expansive evolution of investment choices since Filbeck et al. (2005), short and simple risk surveys no longer accurately gauge investor risk tolerance. Surveys require deeper inquiries into investor personality to provide meaningful financial advice. Oehler et al. (2018) researched the impact of extraversion and neuroticism, two of the Big Five personality traits, on financial decision-making and found significant impacts. Lai (2019) also investigated the value of in-depth personality assessments for investment consulting and found that each of the Big Five personality traits affects individual investment opinions and inclinations.

THE MISSING LINK: PERSONALITY AND RISK

In addressing the shortcomings of risk tolerance questionnaires, Pan and Statman (2013) provide a framework for determining investor sentiment around risk tolerance. Using the Big Five Personality Assessment, they found that investor personality plays a role in determining investor risk preferences, which is helpful in rethinking the traditional structure of risk surveys.

We base our paper on the research by Pan and Statman for two main reasons:

1. First, Pan and Statman establish a base for examining the nuances of risk, such as trust, overconfidence, maximization, regret, and luck versus skill attribution.
2. Second, Pan and Statman establish correlations between four of the five Big Five personality traits and risk tolerance.

For example, Pan and Statman (2013) found low risk tolerance among conscientious individuals and high risk tolerance among

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extraverts. We seek to extend their connections between various personality traits and nuanced propensities of risk tolerance by testing their findings on a sample of college students. We also seek to evaluate how neuroticism, the Big Five trait omitted by Pan and Statman (2013), interacts with various risk factors and to evaluate whether or not the trait reveals inconsistencies with existing literature. We speculate that the presence of this trait may impact reporting bias, because individuals who are neurotic are more likely to vary their responses across time periods.

Filbeck et al. (2005) also studied the connections between personality and risk tolerance. Specifically, Filbeck et al. (2005) show that personality-type indicators are highly correlated with risk tolerance. Using the Myers-Briggs Type Indicator, their research showed that "thinkers" tended to be more risk tolerant than "feelers," demonstrating that personality assessments can function as valuable tools in assessing client risk tolerance. Contrary to Pan and Statman (2012), Filbeck et al. (2005) found introversion and extraversion to be insignificant factors in determining investor risk aversion.

We seek to explore the discrepancies between these two studies in our survey of nuanced risk tolerance factors and personality types. One possible reason for the conflicting results may be differences in the personality assessments that were used.

WHY THE BIG FIVE?

Four commonly used personality tests are the Big Five Personality Assessment, the Myers-Briggs Type Indicator, the Keirsey Temperament Sorter, and the VIA Character Strengths Survey. The VIA survey has gained prominence in recent years, prompting research into relationships between VIA character traits and financial decisions. One example comes from Jordan and Rand (2018), which found that the character traits of caring, leadership, inquisitiveness, and self-control all have large mediating effects on financial decision-making.

We chose, however, to use the Big Five Personality Assessment, for two main reasons:

1. First and foremost, we were aiming to extend and validate the work of Pan and Statman (2013), which used the Big Five Personality Assessment as part of its risk tolerance model.
2. Second, our use of the Big Five Personality Assessment would continue the ongoing interest in the Big Five traits as predictors of financial decision-making and risk tolerance (e.g., Alohali et al. 2018; Huels and Parboteeah 2019; Lai 2019; Oehler et al. 2018; and Tauni et al. 2017).

The following are brief descriptions of the Big Five personality traits:

Extraversion. The first Big Five trait, extraversion, measures an individual's source of energy. People with higher levels of extraversion draw their energy from the external environment. Extraverted individuals focus attention on the outside world and learn most effectively when engaged in an activity. Individuals who scored lower on the extraversion scale are determined to be introverted, meaning they draw energy from internal reflection.

Agreeableness. The second Big Five trait, agreeableness, is associated with appreciativeness, optimism, generosity, and trust. Individuals with a high degree of agreeableness tend to be warm, friendly, and tactful. People who are more agreeable tend to be cooperative and less competitive, and people who are less agreeable tend to be competitive and less sensitive to the feelings of others.

Conscientiousness. The third Big Five trait, conscientiousness, describes an individual's level of organization and thoroughness, and is commonly linked with attention to detail and the extent to which the individual is able to adhere to a schedule. The literature shows that conscientiousness directly correlates with professional, academic, and familial success. Duckworth and Weir (2011) established a positive relationship between conscientiousness and objective success (measured by income and wealth) and subjective success (measured by life satisfaction). They investigated links between each of the Big Five traits and success and found that conscientiousness was better correlated with earnings than any of the other four traits.

Neuroticism. The fourth Big Five trait is neuroticism. Neurotic individuals often are exasperated and easily worried by external events. Individuals who score high in neuroticism often experience anxiety, irritability, and stress. McCrae and Costa (1999) relate neuroticism to depression. People who are low in neuroticism are considered emotionally resilient. Individuals who score extremely low on the neurotic scale often are considered to be carefree.

Openness. The fifth Big Five trait, openness, measures how receptive individuals are to novel ideas as well as their curiosity and innovation. Individuals who score high in openness are generally considered to be insightful and creative. People who rank lower in openness tend to be categorized as traditional; these individuals often are resistant to change, do not enjoy new things, and prefer more-concrete concepts.

DEMOGRAPHICS

In addition to considering how personality impacts investor risk preferences, it is also important to consider differences in investor demographics. Grable (2000) analyzes both demographic and socioeconomic characteristics to show that individuals who

are male, older, married, educated, and employed tend to have more tolerance of financial risk. Riley and Chow (1992) also suggest that age, education, wealth, and relationship status play roles in determining individual risk preferences. Our paper advances our understanding of the determinants of risk tolerance by also exploring relationships between demographics and risk tolerance attitudes.

METHODOLOGY

We surveyed approximately 1,100 college students in January 2019 to test the effect of independent variables via the Big Five personality traits on dependent variables that indicate risk preference. We extended the finding of Pan and Statman (2013) by testing the robustness of their research on a sample of college students. We used most survey questions verbatim from the Pan and Statman survey along with some modified questions that are better-suited for students.

To validate our instrument, we created a survey incorporating questions from the surveys of Pan and Statman (2013) and the Big Five Personality Assessment and administered it to college students in an introductory finance class in January 2019. We also collected demographic information in the survey.

To validate our instrument, we created a survey incorporating questions from the surveys of Pan and Statman (2013) and the Big Five Personality Assessment and administered it to college students in an introductory finance class in January 2019.

The survey was administered through Qualtrics, an online survey instrument. Although the length of the survey was a potential concern, the median survey time was just more than nine minutes. Revilla and Höhne (2020) shows that the optimal online survey length is between ten and fifteen minutes, suggesting that our survey's length is ideal.

At the close of the survey period, 1,137 survey responses were received. Some responses were excluded from the sample due to lack of response, resulting in a sample size of roughly 1,100 for each of our variables.

Table 1 lists the descriptive statistics for the dependent and independent variables in this study. The independent variables include gender, financial history, race/ethnicity, family status, political affiliation, and work history.

A detailed list of variables, variable definitions, and numerical values associated with the variables can be found in appendix B.

We report the results for estimated ordinary least squares regressions with adjustments for heteroskedasticity and tests for multicollinearity. For heteroskedasticity-consistent covariances, we use the adjustment of White (1980). To test for multicollinearity, we use variance inflation factors (VIFs) and ensure all VIFs are below 10.

RESULTS

Through our analysis, we uncovered correlations between personality traits (the independent variables) and investor propensities for risk tolerance, overconfidence, maximization, regret, trust, attributing success to luck or skill, and life satisfaction (the dependent variables).

The personality traits were scored from 0 to 40, with higher values indicating an individual identified more closely with the given personality trait. For example, an individual who scored 22 on the extraversion questions would be considered to be slightly extraverted, because a score of 20 is neutral on the introversion–extraversion scale.

Table 2 provides descriptive statistics about the personality traits of the students who participated in this study. For example, table 2 reports that the mean score for extraversion was 23.5, indicating that the average student respondent was slightly extraverted.

Table 3 shows the correlations between the Big Five traits (extraversion, agreeableness, conscientiousness, neuroticism, and openness) within the study sample.

Tables C1–C9 in appendix C list the correlations between personality traits and investor propensities, with each table displaying one of the dependent variables, such as regret, trust, etc.

The individual relationships found in the analysis are discussed below.

Conscientiousness positively correlates with success attribution to luck. Our analysis established that individuals who scored high in conscientiousness had a propensity to attribute success to luck over skill when compared with individuals who scored low in conscientiousness. We consider this finding to be interesting considering the tendency of highly conscientious people to follow tight schedules for goal achievement instead of relying on chance; it seems to suggest that highly conscientious people do not correlate their success with their efforts. This linkage underscores the nuanced dimensions of investor preferences. A potential explanation is that thoughtful and disciplined individuals recognize that plans and schedules

Table 1

DESCRIPTIVE STATISTICS FOR THE DEPENDENT AND INDEPENDENT VARIABLES

Variable	N	Mean	Median	Standard Error	T Stat	P-value	Min	Max
Panel A: Dependent Variables								
Risk Tolerance (Measure One)	1108	1.99	2	0.028	72.1	<.0001	1	4
Risk Tolerance (Measure Two)	1102	5.78	5	0.104	55.6	<.0001	1	12
Overconfidence	1104	2.77	3	0.033	83.2	<.0001	1	5
Propensity to Attribute Success to Luck over Skill (Measure One)	1102	4.54	5	0.069	66.2	<.0001	1	10
Propensity to Attribute Success to Luck over Skill (Measure Two)	1098	5.85	6	0.062	94.3	<.0001	1	10
Propensity for Maximization	1102	6.32	7	0.079	79.8	<.0001	1	10
Regret	1095	6.60	7	0.077	85.4	<.0001	1	10
Trust	1099	5.98	6	0.066	90.1	<.0001	1	10
Life Satisfaction	1098	7.86	8	0.053	148.1	<.0001	1	10
Panel B: Independent Variables								
Female	1119	0.37	0	0.014	25.4	<.0001	0	1
Male	1119	0.62	1	0.015	42.4	<.0001	0	1
Other Gender	1119	0.01	0	0.002	2.7	0.0081	0	1
International Student	1119	0.05	0	0.007	7.8	<.0001	0	1
Past Purchase of Stock/Mutual Funds	1109	0.30	0	0.014	21.9	<.0001	0	1
Percent of College Being Paid for by the Student	1108	51.71	62	1.211	42.7	<.0001	0	100
Freshman	1119	0.15	0	0.011	14.3	<.0001	0	1
Sophomore	1119	0.49	0	0.015	32.7	<.0001	0	1
Junior	1119	0.24	0	0.013	18.8	<.0001	0	1
Senior	1119	0.11	0	0.009	11.5	<.0001	0	1
African American	1119	0.01	0	0.003	3.3	0.0009	0	1
American Indian	1119	0.00	0	0.002	2.0	0.0455	0	1
Asian	1119	0.05	0	0.006	7.4	<.0001	0	1
Latino/Hispanic	1119	0.05	0	0.007	7.7	<.0001	0	1
Pacific Islander	1119	0.01	0	0.003	3.3	0.0009	0	1
Caucasian	1119	0.85	1	0.011	79.0	<.0001	0	1
Marital Status (Married)	1119	0.20	0	0.012	16.7	<.0001	0	1
Age	1108	21.34	21	0.053	405.8	<.0001	17	34
Family Financial Situation: Poor	1119	0.03	0	0.005	5.6	<.0001	0	1
Family Financial Situation: Lower-Middle Class	1119	0.26	0	0.013	20.0	<.0001	0	1
Family Financial Situation: Upper-Middle Class	1119	0.61	1	0.015	41.7	<.0001	0	1
Family Financial Situation: Wealthy	1119	0.09	0	0.009	10.6	<.0001	0	1
Hours Worked (Weekly)	1056	22.9	25	0.363	63.1	<.0001	2.5	40
Parental Income	1101	112.1	100.2	1.764	63.5	<.0001	30	200
Conservative	1119	0.68	1	0.014	48.9	<.0001	0	1
Liberal	1119	0.10	0	0.009	10.9	<.0001	0	1
Non-Political	1119	0.21	0	0.012	17.3	<.0001	0	1
Mom Attended College	1119	0.05	0	0.007	7.9	<.0001	0	1
Dad Attended College	1119	0.18	0	0.011	15.7	<.0001	0	1
Both Parents Attended College	1119	0.66	1	0.014	46.3	<.0001	0	1
Neither Parent Attended College	1119	0.10	0	0.009	11.2	<.0001	0	1

Note: Excluding the independent variables "Percent of College Being Paid for by the Student," "Age," "Hours Worked (Weekly)," and "Parental Income," all independent variables are reported as binary "yes/no" variables, with 1 signifying "yes" and 0 signifying "no."

Table 2

DESCRIPTIVE STATISTICS FOR PERSONALITY TYPES

Variable	N	Mean	Median	Standard Error	T Stat	P-value	Min	Max
Extraversion	1090	23.49	24	0.251	93.45	<.0001	0	40
Agreeableness	1094	31.25	32	0.168	185.86	<.0001	8	40
Conscientiousness	1084	28.63	28	0.199	141.19	<.0001	8	40
Neuroticism	1086	23.1	23	0.238	96.88	<.0001	2	40
Openness	1090	27	27	0.186	145.49	<.0001	5	40

Table 3

CORRELATIONS BETWEEN PERSONALITY FACTORS

	Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness
Extraversion	1	–	–	–	–
Agreeableness	0.326	1	–	–	–
Conscientiousness	0.036	0.15	1	–	–
Neuroticism	0.142	0.091	0.151	1	–
Openness	0.231	0.278	0.059	0.105	1

ultimately are subject to chance, and less conscientious individuals believe their standing in life is a direct result of their actions or inactions. Regardless of the rationale behind this relationship, the correlation is representative of undetected nuances in investor preferences. This correlation also supports the need for enhanced survey approaches to reviewing investor personality in order to provide financial advisors with accurate client profiles.

Openness positively correlates with maximization. Our survey also revealed that individuals with relatively higher levels of openness have a greater propensity for maximization than individuals with lower levels of openness. High levels of openness are associated with eagerness to tackle new challenges. An individual who ranks high on the maximization scale tends to be one who strives for success and recognition, so one could assume a positive correlation between high openness and high maximization, and our data support this assumption.

Conscientiousness negatively correlates with overconfidence. Consistent with the findings of Pan and Statman (2013), we also find conscientiousness to be inversely related to overconfidence; individuals with lower levels of conscientiousness are more likely to exhibit overconfidence than individuals with relatively higher levels of conscientiousness. The relationship indicates that individuals who are more carefree may be more confident in their investment decisions than individuals who plan for the future and track investments more carefully. Financial advisors could apply this linkage to understanding clients and constructing tailor-made portfolios for them.

Neuroticism positively correlates with overconfidence. Additionally, our results show that someone with a higher level of neuroticism, characterized by emotional instability, is more likely to exhibit overconfidence than an emotionally stable individual. This correlation may be important for financial advisors because it shows the potential value of measuring neuroticism in order to determine the reliability of client responses. Given the association of neuroticism with mood swings and instability, respondents who rank high in this trait are more likely to respond differently depending on their mood at the time of survey. This suggests that financial advisors may benefit by surveying each client multiple times in order to avoid potential response bias due to mood.

Extraversion, neuroticism positively correlate with life satisfaction. We also find that individuals with high levels of extraversion and those with high levels of neuroticism tend to show greater levels of life satisfaction. The relationship between extraversion and life satisfaction is consistent with literature on personality and life satisfaction (Schimmack et al. 2004). This relationship can be explained partly by the more specific traits captured in the measurement of extraversion, such as cheerfulness and positivity, which behave as positive indicators of life satisfaction. The relationship between neuroticism and life satisfaction, however, runs counter to conclusions drawn by psychologists. Neuroticism, which includes a depression component, normally is linked to lower levels of life satisfaction (Schimmack et al. 2004). This contradiction between our data and the literature appears to support our assertion that individuals who score high on the neurotic scale may not produce consistent risk assessment results, and that financial advisors ought to give this particular trait special attention.

Openness negatively correlates with regret. The final relationship we report on is openness as it relates to regret. Pan

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and Statman (2013) find no statistical significance between openness and regret. In contrast, our sample and tests indicate that individuals with higher levels of openness have a relatively lower propensity for regret. A possible explanation for this contradiction with Pan and Statman (2013) is that our sample consists of emerging adults who may not have had the life experience to manifest regret.

LIMITATIONS AND FUTURE RESEARCH

One main limitation of our research is the generalizability of our sample, which is fairly demographically homogenous, as shown in table 1. Future work could attempt to survey a more diverse population. Our sample is also limited by age. Although college students provide a convenient and robustly sized sample, the transferability of college students' personality trait correlations with risk tolerance to adult populations is limited. Our findings mostly align with Pan and Statman (2013), which suggests that discovered correlations between personality and risk tolerance may persist from young adulthood into later life. We recommend that future research attempt a more longitudinal approach, surveying individuals in early adulthood and again in later adulthood to determine the variability of personality correlations with risk tolerance over time.

Another limitation comes from the survey location. We surveyed students at a private university in the western United States. We note that Laajaj et al. (2019) find that the Big Five Personality Assessment works differently in non-Western, Educated, Industrialized, Rich, and Democratic (WEIRD) countries. Often the Big Five fails to accurately assess personality traits in non-WEIRD countries, which constrains the validity of our findings to WEIRD countries. Future research could compare Big Five testing among multiple WEIRD countries, or it could examine a similar model using the VIA Character Strengths Survey for non-WEIRD countries instead of the Big Five test.

CONCLUSION

The results of our study provide the ability to answer questions about the generalizability of an enhanced survey approach of personality and its relationship to investment tendencies. By surveying emerging adults, we have obtained data that provide cross-verification of personality inventories and speak to the need for financial advisors to examine personality factors when crafting investment strategies. For our analysis of personality types, we perform a series of regressions using the dependent variables of risk tolerance, overconfidence, maximization, regret, trust, life satisfaction, and propensity to attribute success to luck over skill against the Big Five personality traits.

We find the enhanced survey approach demonstrates relationships between personality traits and investors' risk tolerance propensities, even when extended to a group of students with limited financial experience. The relationships between personality traits and risk tolerance propensities exist in the case of a younger constituency and among a group of experienced investors, the latter of which was validated by Pan and Statman (2013). These findings attest to the value of personality analysis in financial consulting—both among experienced investors and relatively inexperienced investors.

Our results validate existing literature and suggest potential reporting bias associated with the trait of neuroticism. This reporting bias has implications for financial advisors who are consulting with emerging adults. High levels of neuroticism correlate with a propensity for negatively biased self-evaluations (Robinson et al. 2007). Our data exhibits this variance of self-reporting among individuals who scored high on the neuroticism scale. To mitigate this variance, financial consultants could repeat risk assessments for potential investors who display high levels of neuroticism. Financial consultants also could administer risk tolerance assessments that employ indirect measures of risk tolerance rather than relying on self-reporting queries.

We also find that individuals with higher levels of conscientiousness are more likely to attribute success to luck over skill and exhibit lower levels of overconfidence.

Additionally, our study demonstrates the propensity for maximization is higher among individuals with a high degree of openness.

Investment professionals can use our research as a guide for client advisement. We recommend administering the Big Five Personality Assessment to clients to better understand how they will respond to different investing options. Consultants and planners can use our model estimates, shown in appendix C, as examples to create their own models for sophisticated measures of client risk preferences and attitudes.

Observed association could also add value; for example, someone with a higher level of openness might be more prone to maximization, or someone with a higher level of conscientiousness might want lower-risk investment options due to lower overconfidence and attributing success to luck over skill. These associations can add value as planners construct client portfolios.

In conclusion, this research underscores the nuanced dimensions of investor preferences and the opportunity for financial advisors to better understand their clients' investment propensities through personality analysis.

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REFERENCES

Alohali, M., N. Clarke, F. Li, and S. Furnell. 2018. Identifying and Predicting the Factors Affecting End-User's Risk-taking Behavior. *Information & Computer Security* 26, no. 3: 306–326.

Duckworth, A., and D. Weir. 2011. Personality and Response to the Financial Crisis. Michigan Retirement Research Center Research Paper No. WP 2011-260 (December 1). https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2006595.

Filbeck, G., P. Hatfield, and P. Horvath. 2005. Risk Aversion and Personality Type. *Journal of Behavioral Finance* 6, no. 4: 170–180.

Grable, J. E. 2000. Financial Risk Tolerance and Additional Factors That Affect Risk Taking in Everyday Money Matters. *Journal of Business and Psychology* 14, no. 4 (June): 625–630.

Huels, B., and K. P. Parboteeah. 2019. Neuroticism, Agreeableness, and Conscientiousness and the Relationship with Individual Taxpayer Compliance Behavior. *Journal of Accounting and Finance* 19, no. 4: 181–193.

Jordan, M. R., and D. G. Rand. 2018. The Role of Character Strengths in Economic Decision-Making. *Judgment and Decision Making* 13, no. 4 (July): 382–392.

Laajaj, R., K. Macours, D. A. Pinzon Hernandez, O. Arias, S. D. Gosling, J. Potter, M. Rubio-Codina, and R. Vakis. 2019. Challenges to Capture the Big Five Personality Traits in non-WEIRD populations. *Science Advances* 5, no. 7 (July): 1–13.

Lai, C., 2019. Personality Traits and Stock Investment of Individuals. *Sustainability* 11, no. 19: 1–20.

Lucarelli, C., P. Uberti, and G. Brighetti. 2015. Misclassifications in Financial Risk Tolerance. *Journal of Risk Research* 18, no. 4: 467–482.

McCrae, R. R., and P. T. Costa, Jr. 1999. A Five-Factor Theory of Personality. Chapter 5 in L. A. Pervin and O. P. John (eds.). *Handbook of Personality: Theory and Research*, 2nd ed. New York: Guilford Press: 139–153.

Oehler, A., S. Wendt, F. Wedlich, and M. Horn. 2018. Investors' Personality Influences Investment Decisions: Experimental Evidence on Neuroticism. *Journal of Behavioral Finance* 19, no. 1: 30–48.

Pan, C. H., and M. Statman. 2012. Questionnaires of Risk Tolerance, Regret, Overconfidence, and Other Investor Propensities. *Journal of Investment Consulting* 13, no. 1: 54–63.

———. 2013. Investor Personality in Investor Questionnaires. *Journal of Investment Consulting* 13, no. 1: 48–56.

Revilla, M., and J. K. Höhne. 2020. How Long Do Respondents Think Online Surveys Should Be? New Evidence From Two Online Panels in Germany. *International Journal of Market Research* 62, no. 5 (September): 538–545.

Riley, Jr., W. B., and K. V. Chow. 1992. Asset Allocation and Individual Risk Aversion. *Financial Analysts Journal* 48, no. 6 (November/December): 32–37.

Robinson, M. D., S. Ode, S. K. Moeller, and P. W. Goetz. 2007. Neuroticism and Affective Priming: Evidence for a Neuroticism-Linked Negative Schema. *Personality and Individual Differences* 42, no. 7 (May): 1,221–1,231.

Schimmack, U., S. Oishi, R. M. Furr, and D. C. Funder. 2004. Personality and Life Satisfaction: A Facet-Level Analysis. *Personality and Social Psychology Bulletin*, *30*, no. 8 (August): 1,062–1,075.

Tauni, M. Z., Z. Rao, H. Fang, S. S. Mirza, Z. A. Memon, and K. Jebran. 2017. Do Investor's Big Five Personality Traits Influence the Association Between Information Acquisition and Stock Trading Behavior? *China Financial Review International* 7, no. 4: 450–477.

White, H. 1980. A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity. *Econometrica* 48, no. 4 (May): 817–838.

Yook, K. C., and R. Everett. 2003. Assessing Risk Tolerance: Questioning the Questionnaire Method. *Journal of Financial Planning* 16, no. 8 (August): 48.

APPENDIX A: INVESTOR PERSONALITY SURVEY

In Questions 1 through 5, for each statement mark the number that describes how much you agree on a scale of 1–5, where 1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree, and 5=agree.

QUESTION 1: Extraversion Measure

	1 Disagree	2 Slightly Disagree	3 Neutral	4 Slightly Agree	5 Agree
I am the life of the party.					
I feel little concern for others.					
I am always prepared.					
I get stressed out easily.					
I have a rich vocabulary.					
I don't talk a lot.					
I am interested in people.					
I leave my belongings around.					
I am relaxed most of the time.					
I have difficulty understanding abstract ideas.					

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QUESTION 2: Agreeableness Measure

	1 Disagree	2 Slightly Disagree	3 Neutral	4 Slightly Agree	5 Agree
I feel comfortable around people.					
I insult people.					
I pay attention to details.					
I worry about things.					
I have a vivid imagination.					
I keep in the background.					
I sympathize with others' feelings.					
I make a mess of things.					
I seldom feel blue.					
I am not interested in abstract ideas.					

QUESTION 3: Conscientiousness Measure

	1 Disagree	2 Slightly Disagree	3 Neutral	4 Slightly Agree	5 Agree
I start conversations.					
I am not interested in other people's problems.					
I get chores done right away.					
I am easily disturbed.					
I have excellent ideas.					
I have little to say.					
I have a soft heart.					
I often forget to put things back in their proper place.					
I get upset easily.					
I do not have a good imagination.					

QUESTION 4: Neuroticism Measure

	1 Disagree	2 Slightly Disagree	3 Neutral	4 Slightly Agree	5 Agree
I talk to a lot of different people at parties.					
I am not really interested in others.					
I like order.					
I change my mood a lot.					
I am quick to understand things.					
I don't like to draw attention to myself.					
I take time out for others.					
I shirk my duties.					
I have frequent mood swings.					
I use difficult words.					

QUESTION 5: Openness Measure

	1 Disagree	2 Slightly Disagree	3 Neutral	4 Slightly Agree	5 Agree
I don't mind being the center of attention.					
I feel others' emotions.					
I follow a schedule.					
I get irritated easily.					
I spend time reflecting on things.					
I am quiet around strangers.					
I make people feel at ease.					
I am exacting in my work.					
I often feel blue.					
I am full of ideas.					

QUESTION 6: You are on a TV game show and can choose one of the following. Which option would you choose?

☐ $1,000 in cash (known payoff = $1,000)
☐ 50% chance at winning $5,000 (expected payoff = $2,500)
☐ 25% chance at winning $10,000 (expected payoff = $2,500)
☐ 5% chance at winning $100,000 (expected payoff = $5,000)

QUESTION 7: Suppose you are the only income earner in the family, and your current job is guaranteed to give you your current income every year for life. Now you have an opportunity to take a new and equally good job. The new job has a 50–50 chance to increase by 50 percent your standard of living every year during your lifetime.

However, the new job also has a 50–50 chance to reduce by X percent your standard of living every year during your lifetime. Indicate the maximum X percent reduction in the standard of living you are willing to accept. (Circle one)

0% 5% 10% 15% 20% 25% 30%

QUESTION 8: How would you rank your overall talent compared to your classmates?

☐ I am more talented than 90% of my classmates
☐ I am more talented than 70% of my classmate
☐ I am more talented than 50% of my classmates
☐ I am more talented than 30% of my classmates
☐ I am more talented than 10% of my classmates

QUESTION 9: Some people believe that they can pick stocks that would earn higher-than-average returns. Other people believe that they are unable to do so. Please rank your agreement with the following statement, with a score of 10 indicating you agree and a score of 1 indicating you disagree. "I strongly believe I can pick higher-than-average stocks." (Circle one)

1 2 3 4 5 6 7 8 9 10

QUESTION 10: Rank your agreement with the following statement, with a score of 10 indicating you agree and a score of 1 indicating you disagree. "Second best is not good enough for me. I always want to have the best." (Circle one)

1 2 3 4 5 6 7 8 9 10

QUESTION 11: Rank your agreement with the following statement, with a score of 10 indicating you agree and a score of 1 indicating you disagree. "Whenever I make a choice, I try to get information about how the other alternatives turned out and feel bad if another alternative has done better than the alternative I have chosen." (Circle one)

1 2 3 4 5 6 7 8 9 10

QUESTION 12: Rank your agreement with the following statement, with a score of 10 indicating you agree and a score of 1 indicating you disagree. "Generally speaking, would you agree that most people can be trusted?" (Circle one)

1 2 3 4 5 6 7 8 9 10

QUESTION 13: On the whole, how satisfied are you with your life? Please rate your level of satisfaction on a scale ranging from "Not at all satisfied " to "Very satisfied (10)." Scores range from 1 to 10, where high scores indicate higher levels of satisfaction. (Circle one)

1 2 3 4 5 6 7 8 9 10

QUESTION 14: Is success in picking stocks that earn higher-than-average returns due to skill or luck? Rank your belief, with a score of 10 indicating higher-than-average returns are totally due to skill and a score of 1 indicating higher-than-average returns are totally driven by luck. (Circle one)

1 2 3 4 5 6 7 8 9 10

QUESTION 15: What is your status at [Name of University]?

☐ Freshman
☐ Sophomore
☐ Junior
☐ Senior
☐ Graduate

QUESTION 16: To which gender identity do you most identify?

☐ Female
☐ Male
☐ Transgender Female
☐ Transgender Male
☐ Gender Variant/Non-Conforming
☐ Not Listed
☐ Prefer Not to Answer

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QUESTION 17: How do you identify your race?

- ☐ African American/Black
- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Latino/Hispanic
- ☐ Native Hawaiian or Pacific Islander
- ☐ White/Caucasian
- ☐ Other
- ☐ Prefer Not to Answer

QUESTION 18: What is your marital status?

- ☐ Never married
- ☐ Married
- ☐ Widowed
- ☐ Divorced
- ☐ Separated
- ☐ Prefer Not to Answer

QUESTION 19: How old are you?

17 or younger 18–25 26–34 35 or older

QUESTION 20: How would you characterize your family's financial situation while growing up?

- ☐ Poor
- ☐ Lower-Middle class
- ☐ Upper-Middle class
- ☐ Wealthy

QUESTION 21: Are you an international student (from a country other than the United States)?

- ☐ Yes
- ☐ No

QUESTION 22: If you are an international student, what country are you from?

_____

QUESTION 23: What is your college major or intended major?

_____

QUESTION 24: On average, over the past year, how many hours per week did you work in paid employment? (Circle one)

0 5 10 15 20 25 30 35 40 or more

QUESTION 25: Have you ever purchased stock or mutual funds?

- ☐ Yes
- ☐ No

QUESTION 26: How much do you estimate your parents' combined income is?

- ☐ Under than $30,000
- ☐ $30,001–$50,000
- ☐ $50,001–$85,000
- ☐ $85,001–$100,000
- ☐ $100,001–$200,000
- ☐ Greater than $200,000

QUESTION 27: How would you identify politically?

- ☐ Conservative
- ☐ Liberal/progressive
- ☐ Not political

QUESTION 28: What percentage of your college expenses are you paying?

- ☐ 0%
- ☐ 1–25%
- ☐ 26–50%
- ☐ 51–75%
- ☐ 76–99%
- ☐ 100%

QUESTION 29: Is your mom and/or dad a college graduate?

- ☐ Mom
- ☐ Dad
- ☐ Both
- ☐ Neither

APPENDIX B: VARIABLES, DEFINITIONS, AND NUMERICAL VALUES

Variable	Definition	Numerical Value
Extraversion	Quantitative representation of respondent's level of Extraversion in the context of the Big Five personality test. Respondents ranked 10 statements associated with Extraversion on a 5-point Likert scale. See appendix A-Q1 for the 10 statements used for the measure.	23.5 mean (40 max)
Agreeableness	Quantitative representation of respondent's level of Agreeableness in the context of the Big Five personality test. Respondents ranked 10 statements associated with Agreeableness on a 5-point Likert scale. See appendix A-Q2 for the 10 statements used for the measure.	31.3 mean (40 max)
Conscientiousness	Quantitative representation of respondent's level of Conscientiousness in the context of the Big Five personality test. Respondents ranked 10 statements associated with Conscientiousness on a 5-point Likert scale. See appendix A-Q3 for the 10 statements used for the measure.	28.6 mean (40 max)
Neuroticism	Quantitative representation of respondent's level of Neuroticism in the context of the Big Five personality test. Respondents ranked 10 statements associated with Neuroticism on a 5-point Likert scale. See appendix A-Q4 for the 10 statements used for the measure.	23.1 mean (40 max)
Openness	Quantitative representation of respondent's level of Openness in the context of the Big Five personality test. Respondents ranked 10 statements associated with Openness on a 5-point Likert scale. See appendix A-Q5 for the 10 statements used for the measure.	27.0 mean (40 max)
Risk Tolerance (M1)	How much risk the respondent is willing to accept when presented an opportunity for financial gain. Measured with hypothetical game show scenario to mitigate respondent bias in assessing risk tolerance. See appendix A-Q6 for details.	2.0 mean (4 max)
Risk Tolerance (M2)	How much risk the respondent is willing to accept when presented an opportunity for financial gain. Measured with hypothetical employment scenario to mitigate respondent bias in assessing risk tolerance. See appendix A-Q7 for details.	5.8 mean (12 max)
Overconfidence	Measure of respondent's confidence in their own abilities in the context of the abilities of their peers. See appendix A-Q8 for details.	2.8 mean (5 max)
Propensity to Attribute Luck over Skill (M1)	Measure of respondent's propensity to attribute success to either luck or skill. Asked respondents to rank their own ability to pick stocks with higher-than-average returns on a 10-point Likert scale. See appendix A-Q9 for details.	4.5 mean (10 max)
Propensity to Attribute Luck over Skill (M2)	Measure of respondent's propensity to attribute success to either luck or skill. Asked respondents to rank personal perception of the relationship between skill and picking stocks with higher-than-average returns on a 10-point Likert scale. See appendix A-Q14 for details.	5.9 mean (10 max)
Propensity for Maximization	Measure of respondent propensity to maximize returns. Asked to rank agreement with the statement "Second best is not good enough for me. I always want to have the best" on a 10-point Likert scale. See appendix A-Q10 for details.	6.3 mean (10 max)
Regret	Measure of respondent regret. Asked to rank agreement with the statement "Whenever I make a choice, I try to get information about how the other alternatives turned out and feel bad if another alternative has done better than the alternative I have chosen" on a 10-point Likert scale. See appendix A-Q11 for details.	6.6 mean (10 max)
Trust	Measure of respondent trust. Asked to rank agreement with the statement "Generally speaking, would you agree that most people can be trusted" on a 10-point Likert scale. See appendix A-Q12 for details.	6.0 mean (10 max)
Life Satisfaction	Measure of respondent life satisfaction. Asked to rate level of life satisfaction on 10-point Likert scale. See appendix A-Q13 for details.	7.9 mean (10 max)
Gender	Asked which gender the participant most identified with. Presented with 7 possible choices. See appendix A-Q16 for details. For reporting purposes, we report percent female, percent male, and percent "other gender," a category encompassing the other 5 responses.	See Table 1 for data from here and below
International Student	Binary measure of international student status of respondent. See appendix A-Q21 for details.	
Past Purchase of Stock/Mutual Funds	Binary measure of past respondent purchase of stock or mutual funds. See appendix A-Q25	
Percent of College Paying For	Measure of amount of college respondent personally pays for. Asked to choose from 6 ranges of percentages. See appendix A-Q28 for details.	
University Status	Measure of respondent university statues: Freshman, Sophomore, Junior, Senior, or Graduate Student. See appendix A-Q16 for details.	
Race	Asked which race the participant most identified with. Presented with 8 possible choices. See appendix A-Q17 for details.	
Marital Status (Married)	Binary measure of marital status. See appendix A-Q18 for details.	
Age	Measure of respondent age. See appendix A-Q19 for details.	
Family Financial Situation	Measure of respondent family financial status. Respondents were given four brackets to choose from. See appendix A-Q20 for details.	
Hours Worked (Weekly)	Measure of average hours per week worked in paid employment. See appendix A-Q24 for details.	
Parental Income	Measure of respondent parental income. Given 6 ranges to choose from. See appendix A-Q26 for details.	
Political Status	Measure of respondent political status. See appendix A-Q27 for details.	
Number of Parents who graduated college	Measure of number of respondent parents who graduated college. See appendix A-Q29 for details.	

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APPENDIX C: CORRELATIONS BETWEEN PERSONALITY FACTORS AND INVESTOR PROPENSITIES

C1: Associations between personality factors and investor propensities with a dependent variable of Risk Tolerance (1)

Variables	Extraversion		Agreeableness		Conscientiousness		Neuroticism		Openness	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
Intercept	4.726	<.0001	0.279	0.860	3.507	0.002**	2.745	0.002**	3.935	0.0005**
Personality Factor	−0.026	0.260	0.056	0.148	0.017	0.490	0.022	0.227	−0.032	0.234
Gender	−0.261	0.053*	−0.001	0.177	−0.001	0.414	−0.114	0.455	−0.0004	0.593
Caucasian	0.530	0.006**	0.186	0.323	0.243	0.209	0.446	0.037**	0.119	0.572
Marital Status	−0.056	0.730	0.026	0.855	0.029	0.84	0.059	0.682	0.114	0.495
Age	0.006	0.875	−0.018	0.611	−0.023	0.493	0.003	0.936	0.009	0.770
Perceived Family Financial Level	−0.140	0.408	0.030	0.843	−0.105	0.473	−0.270	0.083*	−0.245	0.129
International Status	−0.960	0.003**	−0.314	0.340	−0.881	0.017**	−0.953	0.004**	−0.597	0.053*
Hours Worked per Week	0.017	0.681	0.040	0.297	−0.025	0.505	0.021	0.597	−0.061	0.115
Stock	−0.070	0.615	0.099	0.410	0.011	0.925	0.007	0.955	0.055	0.657
Parents' Income	0.043	0.778	0.081	0.542	0.296	0.022**	0.228	0.109	0.283	0.062*
Conservative	−0.115	0.483	−0.162	0.264	−0.090	0.530	−0.137	0.371	0.212	0.184
Liberal	−0.237	0.346	−0.335	0.105	−0.266	0.261	−0.266	0.352	0.214	0.335
Percent of College Being Paid for By Student	−0.001	0.502	0.001	0.685	−0.001	0.646	−0.001	0.725	0.0002	0.884
Mom Attended College	0.133	0.715	−0.244	0.446	−0.246	0.399	−0.016	0.960	0.353	0.334
Dad Attend College	−0.065	0.799	0.087	0.728	−0.330	0.121	0.267	0.275	0.056	0.848
Both Parents Attended College	−0.067	0.779	−0.050	0.828	−0.417	0.033**	0.174	0.445	0.045	0.869

*Statistical significance is denoted with asterisks: * p<0.1, **p<0.05*

C2: Associations between personality factors and investor propensities with a dependent variable of Risk Tolerance (2)

Variables	Extraversion		Agreeableness		Conscientiousness		Neuroticism		Openness	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
Intercept	2.877	0.486	−1.625	0.802	8.419	0.048**	4.567	0.141	8.408	0.06*
Personality Factor	−0.014	0.872	0.149	0.346	−0.037	0.698	0.097	0.129	−0.082	0.441
Gender	−0.176	0.735	−0.002	0.638	−0.001	0.874	−0.297	0.572	−0.003	0.308
Caucasian	1.123	0.129	1.811	0.02**	1.223	0.100	0.055	0.940	0.559	0.506
Marital Status	−0.307	0.627	−0.927	0.111	−0.661	0.236	−1.268	0.011**	−0.854	0.197
Age	0.114	0.404	0.076	0.594	0.111	0.384	0.027	0.835	−0.006	0.960
Perceived Family Financial Level	−0.271	0.678	−0.284	0.645	−1.263	0.025**	−0.166	0.754	−0.469	0.463
International Status	0.014	0.992	−0.842	0.532	−0.913	0.518	−1.540	0.196	−0.008	0.995
Hours Worked per Week	0.040	0.802	0.110	0.482	−0.031	0.830	0.195	0.166	−0.011	0.942
Stock	0.015	0.978	0.720	0.143	0.507	0.272	0.083	0.851	0.288	0.558
Parents' Income	0.453	0.438	1.030	0.059	1.215	0.015**	1.439	0.003**	0.846	0.156
Conservative	1.174	0.068*	0.441	0.457	−0.116	0.834	0.438	0.405	−0.984	0.120
Liberal	2.471	0.012**	2.088	0.015**	1.206	0.194	1.699	0.083*	1.135	0.197
Percent of College Being Paid for By Student	0.004	0.469	0.002	0.781	−0.002	0.727	0.001	0.799	0.0002	0.979
Mom Attended College	2.321	0.100	0.328	0.803	−1.610	0.151	0.238	0.830	1.058	0.465
Dad Attended College	0.095	0.922	−0.623	0.543	−1.359	0.098*	−0.595	0.479	1.317	0.255
Both Parents Attended College	0.409	0.655	−0.101	0.915	−0.659	0.378	−0.620	0.426	0.435	0.686

*Statistical significance is denoted with asterisks: * p<0.1, **p<0.05*

C3: Associations between personality factors and investor propensities with a dependent variable of Luck (1)

Variables	Extraversion		Agreeableness		Conscientiousness		Neuroticism		Openness	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
Intercept	6.166	0.024**	5.572	0.180	9.994	0.0003**	8.462	<.0001**	9.011	0.005**
Personality Factor	0.032	0.589	0.064	0.524	−0.055	0.363	−0.019	0.657	−0.068	0.369
Gender	−1.280	0.0003**	0.002	0.476	0.001	0.579	−1.225	0.0005**	−0.002	0.375
Caucasian	0.007	0.989	−1.080	0.029**	−0.783	0.100	−0.018	0.970	−0.578	0.334
Marital Status	−0.261	0.537	0.035	0.926	0.129	0.717	0.126	0.700	0.181	0.703
Age	−0.195	0.034**	−0.040	0.660	−0.086	0.294	−0.212	0.012**	−0.006	0.943
Perceived Family Financial Level	0.648	0.141	−0.132	0.738	0.173	0.632	0.087	0.804	0.315	0.495
International Status	−1.298	0.117	−1.763	0.041**	−1.901	0.035**	−1.336	0.073*	−1.231	0.160
Hours Worked per Week	0.064	0.545	−0.040	0.691	−0.060	0.512	0.011	0.900	−0.018	0.875
Stock	0.384	0.286	0.909	0.004**	1.022	0.001**	0.311	0.281	0.631	0.074*
Parents' Income	0.258	0.513	0.488	0.161	0.152	0.632	0.216	0.500	−0.004	0.993
Conservative	0.405	0.344	0.464	0.221	0.376	0.289	0.183	0.596	0.643	0.161
Liberal	0.334	0.611	−0.370	0.494	−1.282	0.028**	0.998	0.123	−0.305	0.631
Percent of College Being Paid for By Student	0.003	0.466	0.001	0.823	0.0002	0.962	0.001	0.793	−0.001	0.806
Mom Attended College	−0.193	0.840	−0.411	0.624	1.456	0.043**	0.884	0.228	1.168	0.261
Dad Attended College	0.819	0.215	1.032	0.115	1.639	0.002**	0.655	0.238	0.461	0.578
Both Parents Attended College	0.527	0.395	0.321	0.593	1.069	0.026**	0.403	0.434	0.514	0.504

*Statistical significance is denoted with asterisks: * p<0.1, **p<0.05*

C4: Associations between personality factors and investor propensities with a dependent variable of Luck (2)

Variables	Extraversion		Agreeableness		Conscientiousness		Neuroticism		Openness	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
Intercept	5.973	0.016**	8.329	0.022**	3.607	0.142	5.946	0.001**	7.976	0.004**
Personality Factor	0.017	0.748	0.018	0.846	0.129	0.018**	0.054	0.154	−0.019	0.770
Gender	−0.213	0.505	0.001	0.151	0.001	0.528	−0.032	0.920	−0.002	0.165
Caucasian	−0.774	0.087*	−0.017	0.971	−0.364	0.396	−0.626	0.152	−0.826	0.110
Marital Status	−0.798	0.04**	−0.193	0.568	−0.004	0.990	0.521	0.081*	−0.435	0.289
Age	0.049	0.555	−0.071	0.372	0.036	0.630	−0.193	0.012**	0.007	0.921
Perceived Family Financial Level	0.024	0.952	0.066	0.854	−0.442	0.175	−0.337	0.290	−0.993	0.013**
International Status	−0.741	0.322	−1.938	0.006**	−1.442	0.078*	−0.765	0.256	−0.632	0.403
Hours Worked per Week	0.071	0.462	−0.080	0.384	0.080	0.334	0.160	0.055*	−0.043	0.656
Stock	−0.064	0.846	0.353	0.204	0.508	0.058*	0.124	0.637	−0.015	0.962
Parents' Income	0.708	0.051*	0.273	0.372	0.632	0.028**	0.541	0.064*	0.861	0.021**
Conservative	−0.159	0.688	0.336	0.266	0.213	0.506	0.313	0.318	0.327	0.413
Liberal	−0.123	0.837	0.091	0.850	−0.936	0.075*	−0.664	0.257	0.094	0.865
Percent of College Being Paid for By Student	0.005	0.160	0.005	0.122	−0.006	0.065*	−0.002	0.492	0.001	0.780
Mom Attended College	1.492	0.084	1.482	0.046**	0.948	0.144	1.269	0.057*	0.494	0.581
Dad Attended College	1.232	0.04**	0.832	0.158	0.199	0.674	0.173	0.731	0.929	0.195
Both Parents Attended College	0.695	0.216	0.453	0.407	0.396	0.360	0.531	0.256	0.522	0.432

*Statistical significance is denoted with asterisks: * p<0.1, **p<0.05*

C5: Associations between personality factors and investor propensities with a dependent variable of Maximization

Variables	Extraversion		Agreeableness		Conscientiousness		Neuroticism		Openness	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
Intercept	10.672	0.001**	11.009	0.028**	1.697	0.599	4.845	0.053*	0.806	0.827
Personality Factor	–0.027	0.703	–0.099	0.414	0.105	0.141	0.066	0.198	0.180	0.042**
Gender	–0.298	0.472	–0.003	0.356	–0.002	0.399	–0.751	0.076*	–0.006	0.008**
Caucasian	0.551	0.348	–0.773	0.192	–0.082	0.884	–0.065	0.913	–0.389	0.575
Marital Status	–0.183	0.713	0.140	0.754	0.098	0.817	–0.139	0.727	0.106	0.847
Age	–0.157	0.145	–0.178	0.105	–0.027	0.784	–0.154	0.135	–0.003	0.976
Perceived Family Financial Level	0.794	0.127	0.695	0.143	–0.206	0.629	0.388	0.364	0.561	0.289
International Status	–1.500	0.149	0.215	0.835	0.543	0.612	–0.292	0.761	–0.182	0.864
Hours Worked per Week	0.153	0.220	–0.161	0.177	0.043	0.689	0.231	0.038*	0.017	0.894
Stock	0.517	0.224	0.136	0.719	–0.935	0.008**	–0.489	0.165	–0.129	0.750
Parents' Income	–0.255	0.583	0.091	0.827	1.346	0.0004**	0.735	0.061*	0.266	0.590
Conservative	0.175	0.729	1.189	0.009**	0.528	0.209	0.438	0.298	0.238	0.650
Liberal	–0.823	0.286	0.507	0.434	–1.101	0.111	0.668	0.396	–0.252	0.729
Percent of College Being Paid for By Student	0.002	0.745	0.006	0.192	0.001	0.824	0.003	0.474	0.003	0.610
Mom Attended College	–0.767	0.494	–0.856	0.395	–0.501	0.556	–0.968	0.278	–1.309	0.275
Dad Attended College	–1.008	0.195	–0.965	0.219	0.096	0.877	–1.018	0.132	–0.767	0.423
Both Parents Attended College	–0.780	0.285	–0.916	0.204	–0.615	0.279	–1.029	0.101	–0.564	0.526

*Statistical significance is denoted with asterisks: * p<0.1, **p<0.05*

C6: Associations between personality factors and investor propensities with a dependent variable of Regret

Variables	Extraversion		Agreeableness		Conscientiousness		Neuroticism		Openness	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
Intercept	11.134	0.001**	9.950	0.04**	9.880	0.004**	8.997	0.0004**	15.290	<.0001**
Personality Factor	–0.080	0.259	–0.013	0.913	–0.095	0.202	–0.084	0.105	–0.200	0.001**
Gender	0.275	0.510	–0.005	0.094*	–0.003	0.295	0.111	0.797	0.000	0.838
Caucasian	–0.798	0.178	0.295	0.607	–0.448	0.446	–0.934	0.118	–0.033	0.957
Marital Status	0.106	0.833	0.090	0.835	–0.108	0.809	0.013	0.976	–0.085	0.858
Age	–0.251	0.022**	–0.214	0.045**	–0.103	0.310	–0.059	0.569	–0.055	0.525
Perceived Family Financial Level	0.095	0.857	0.732	0.112	0.628	0.160	0.972	0.026**	0.149	0.746
International Status	–0.075	0.943	–0.789	0.431	–0.155	0.889	–0.0977	0.920	–0.108	0.908
Hours Worked per Week	0.271	0.032**	0.137	0.237	–0.013	0.906	0.104	0.354	0.191	0.087*
Stock	–0.035	0.935	0.003	0.993	–0.087	0.812	0.114	0.748	0.026	0.941
Parents' Income	0.441	0.352	–0.665	0.101	0.363	0.356	–0.128	0.746	–0.529	0.219
Conservative	1.094	0.034**	0.050	0.911	0.552	0.208	0.725	0.09*	0.578	0.205
Liberal	1.056	0.178	–0.137	0.828	0.705	0.326	0.764	0.337	1.219	0.055*
Percent of College Being Paid for By Student	–0.001	0.768	0.002	0.718	0.001	0.767	–0.002	0.727	–0.013	0.004**
Mom Attended College	–2.195	0.053*	–1.166	0.250	1.183	0.193	0.227	0.801	–1.525	0.144
Dad Attended College	–1.968	0.013**	–1.135	0.143	–0.196	0.762	–1.118	0.102	–2.511	0.003**
Both Parents Attended College	–2.026	0.006**	–1.010	0.159	0.152	0.798	–0.650	0.307	–1.575	0.043**

*Statistical significance is denoted with asterisks: * p<0.1, **p<0.05*

C7: Associations between personality factors and investor propensities with a dependent variable of Trust

Variables	Extraversion		Agreeableness		Conscientiousness		Neuroticism		Openness	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
Intercept	–1.519	0.556	3.684	0.346	–0.962	0.714	0.440	0.821	0.114	0.970
Personality Factor	0.036	0.518	–0.017	0.861	0.028	0.627	–0.003	0.945	0.047	0.522
Gender	0.594	0.070*	0.003	0.204	0.003	0.183	0.475	0.152	–0.001	0.717
Caucasian	–0.188	0.684	–0.004	0.993	–0.055	0.905	–0.918	0.046**	–0.627	0.275
Marital Status	0.579	0.141	0.533	0.128	0.100	0.774	0.401	0.202	0.719	0.113
Age	–0.007	0.936	–0.163	0.058*	0.102	0.198	–0.067	0.403	–0.040	0.624
Perceived Family Financial Level	–0.335	0.413	0.243	0.512	–0.130	0.709	0.190	0.568	0.311	0.477
International Status	2.542	0.002**	1.631	0.044**	2.361	0.007**	3.041	<.0001**	2.367	0.008**
Hours Worked per Week	0.237	0.016**	0.081	0.386	0.107	0.227	0.111	0.199	0.138	0.192
Stock	0.614	0.067*	–0.433	0.142	–0.161	0.574	–0.284	0.302	0.178	0.597
Parents' Income	–0.145	0.692	0.418	0.199	0.012	0.970	–0.115	0.707	–0.021	0.960
Conservative	0.790	0.0496**	0.501	0.159	0.379	0.273	0.459	0.163	0.076	0.863
Liberal	0.834	0.173	0.615	0.224	0.552	0.328	0.779	0.204	–0.296	0.624
Percent of College Being Paid for By Student	–0.006	0.112	0.007	0.055*	–0.003	0.333	0.004	0.246	–0.001	0.825
Mom Attended College	–0.055	0.950	–0.203	0.796	0.048	0.945	–1.007	0.148	–0.569	0.566
Dad Attended College	0.231	0.706	–0.583	0.341	0.350	0.489	0.009	0.986	–0.758	0.338
Both Parents Attended College	0.360	0.531	–0.360	0.523	0.507	0.274	0.086	0.860	–0.829	0.260

*Statistical significance is denoted with asterisks: * p<0.1, **p<0.05*

C8: Associations between personality factors and investor propensities with a dependent variable of Satisfaction

Variables	Extraversion		Agreeableness		Conscientiousness		Neuroticism		Openness	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
Intercept	4.923	0.004**	3.567	0.173	5.971	0.001**	2.509	0.036**	6.588	0.004**
Personality Factor	0.045	0.226	0.121	0.058*	0.080	0.043**	0.102	<.0001**	0.014	0.796
Gender	–0.068	0.754	0.001	0.460	0.001	0.671	0.575	0.005**	–0.002	0.128
Caucasian	0.159	0.609	–0.081	0.794	0.125	0.686	–0.221	0.438	–0.459	0.278
Marital Status	0.233	0.377	0.795	0.001**	0.468	0.044**	0.483	0.013**	0.740	0.028**
Age	–0.018	0.757	–0.014	0.814	0.024	0.659	–0.020	0.686	–0.065	0.283
Perceived Family Financial Level	0.216	0.431	0.208	0.402	0.201	0.393	0.434	0.037**	0.016	0.961
International Status	0.999	0.053*	0.037	0.946	–0.583	0.323	1.188	0.007**	0.675	0.277
Hours Worked per Week	–0.036	0.579	–0.034	0.591	–0.024	0.693	0.062	0.249	–0.043	0.579
Stock	0.230	0.304	0.189	0.339	–0.163	0.400	–0.055	0.746	–0.090	0.718
Parents' Income	–0.242	0.324	0.466	0.034**	0.03	0.885	–0.256	0.177	0.349	0.249
Conservative	0.250	0.349	0.343	0.151	0.208	0.369	0.003	0.987	0.005	0.988
Liberal	0.367	0.368	0.027	0.937	–0.511	0.178	–0.084	0.825	–0.732	0.102
Percent of College Being Paid for By Student	–0.003	0.247	–0.0001	0.953	–0.001	0.634	0.003	0.211	0.005	0.144
Mom Attended College	0.212	0.721	–0.743	0.160	–0.120	0.797	0.164	0.707	–0.522	0.477
Dad Attended College	–0.170	0.679	–0.672	0.103	0.370	0.278	–0.023	0.945	–0.089	0.879
Both Parents Attended College	–0.119	0.758	–0.483	0.202	0.350	0.262	–0.099	0.748	0.057	0.917

*Statistical significance is denoted with asterisks: * p<0.1, **p<0.05*

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NUMBER 1
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C9: Associations between personality factors and investor propensities with a dependent variable of Overconfidence

Variables	Extraversion		Agreeableness		Conscientiousness		Neuroticism		Openness	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
Intercept	2.756	0.018**	1.967	0.298	4.969	<.0001**	3.705	<.0001**	5.275	0.0002**
Personality Factor	–0.007	0.788	0.018	0.700	–0.050	0.057*	–0.036	0.050*	–0.073	0.028**
Gender	0.750	<.0001**	–0.0003	0.807	–0.0001	0.954	0.695	<.0001**	0.001	0.229
Caucasian	–0.392	0.065*	0.151	0.501	0.033	0.875	0.244	0.250	–0.088	0.739
Marital Status	0.117	0.515	0.153	0.367	0.108	0.489	–0.054	0.706	0.009	0.966
Age	0.073	0.064*	–0.016	0.701	–0.009	0.795	0.077	0.04**	0.062	0.099*
Perceived Family Financial Level	0.153	0.412	0.135	0.454	0.029	0.852	–0.044	0.774	0.386	0.055*
International Status	–0.125	0.722	0.151	0.700	0.037	0.926	–0.152	0.641	–0.108	0.777
Hours Worked per Week	–0.017	0.702	0.089	0.049**	0.09	0.025**	0.082	0.041**	0.069	0.154
Stock	–0.398	0.011**	–0.733	<.0001**	–0.386	0.003**	–0.341	0.008**	–0.491	0.001**
Parents' Income	–0.174	0.299	–0.385	0.016**	–0.393	0.005**	–0.310	0.029**	–0.339	0.07*
Conservative	0.001	0.996	–0.419	0.016**	–0.297	0.056*	–0.225	0.140	–0.308	0.123
Liberal	–0.398	0.154	–0.304	0.218	0.217	0.394	–0.150	0.599	–0.214	0.440
Percent of College Being Paid for By Student	0	0.991	–0.001	0.562	–0.004	0.009**	–0.002	0.213	–0.002	0.347
Mom Attended College	0.334	0.410	–0.056	0.884	–0.241	0.442	–0.431	0.182	–0.087	0.847
Dad Attended College	–0.007	0.980	–0.113	0.705	–0.558	0.015**	–0.403	0.100	–0.250	0.487
Both Parents Attended College	0.228	0.386	0.220	0.422	–0.292	0.163	–0.139	0.54	–0.194	0.561

*Statistical significance is denoted with asterisks: * p<0.1, **p<0.05*

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