Fall 2021

Gender Differences in Self-Attribution and Overconfidence in Financial Decisions

Aine M. Ford
Gettysburg College

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Behavioral finance and the study into biases is a rapidly increasing area of interest for finance professionals and academics alike. Understanding the sources of overconfidence and the self-attribution bias from a gendered framework can provide insight for managers and industry leaders to insulate their firms from underperformance losses due to these biases. Education and relevant financial experience are key controllable variables that impact overconfidence and self- attribution. Using a survey sent to around 130 students and finance professionals, gender, education, and relevant experience were tested against overconfidence and self-attributional scores to determine if there were any meaningful relationships. The results suggest that gender, education, and experience are all significant magnifiers of potentially harmful biases. As the finance industry grows more demographically representative, the industry leadership and academic datasets need to reflect that trend, a gap which this research aims to address.

Keywords

behavioral finance, overconfidence, self-attribution bias, gender, financial literacy

Disciplines

Finance and Financial Management | Organizational Behavior and Theory | Women's Studies

Comments

Written for MGT 400: Advanced Topics in Business, Irrational Behavior

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Aine Ford

Department of Management, Gettysburg College

MGT 400: Advanced Topics in Business, Irrational Behavior

Dr. Marta Maras

December 14, 2021

Abstract

Behavioral finance and the study into biases is a rapidly increasing area of interest for finance professionals and academics alike. Understanding the sources of overconfidence and the self-attribution bias from a gendered framework can provide insight for managers and industry leaders to insulate their firms from underperformance losses due to these biases. Education and relevant financial experience are key controllable variables that impact overconfidence and self-attribution. Using a survey sent to around 130 students and finance professionals, gender, education, and relevant experience were tested against overconfidence and self-attributional scores to determine if there were any meaningful relationships. The results suggest that gender, education, and experience are all significant magnifiers of potentially harmful biases. As the finance industry grows more demographically representative, the industry leadership and academic datasets need to reflect that trend, a gap which this research aims to address.

Keywords: behavioral finance, self-attribution bias, overconfidence, gender, financial literacy, education

Gendered Differences in Self-Attribution and Overconfidence in Financial Decisions

Because falling victim overconfidence and the self-attribution bias has a notable impact on investor performance (Czaja & Röder, 2020), women are stronger investors than men (Florez, 2017), and women are underrepresented in financial service leadership positions (Danielecki & Ramsay, 2020), the question of how these biases come to be is critical. A factor of interest that is missing in prior literature is commentary on female investors and how demographic and experiential factors influence them in terms of susceptibility to behavioral biases. Because women have been critically underrepresented in finance until very recently, academic literature fails to include them in meaningful representation. However, with an increasingly egalitarian workforce and women representing over half of financial service workers (Florez, 2017), an inclusive management style is essential. This cannot happen without the appropriate research done into understanding exactly how women fall victim to overconfidence and self-attribution and what that means for their investing behavior. My research question is therefore: Is there a gendered difference between experience and education impacting self-attribution and overconfidence in the finance industry?

Heuristics in Finance

Behavioral finance uses the study of heuristics and emotions to understand how markets are impacted by investor behavior. Heuristics are simple mental models, or "rules of thumb," that let people come to conclusions and decisions efficiently, as opposed to fully analyzing all information and then making a decision. While heuristics can simplify complex processes, they can result in cognitive biases such as self-attribution and overconfidence. As people have tend to have inaccurate assessments of their abilities, especially after success, overconfidence can quickly become a mental shortcut (Ackerman & Thompson, 2017). This overconfidence often

stems from self-enhancement, a component of the self-attribution bias. Finance professionals, specifically traders, who experience success often equate this success to their own intelligence and skills, rather than any environmental factor (self-enhancement). Likewise, if a trader experiences loss, he, or she will attribute this perceived failure to an environmental factor, such as market cyclicality or bad luck (self-protection). Self-attribution is a natural way people protect their self-esteem and perceived social status, especially in high intensity work like finance (Mishra & Metilda, 2013). This self-attribution becomes problematic when it, rather inevitably, leads to overconfidence (Gervais & Odean, 2001) and eventual underperformance (Czaja & Röder, 2020).

Prior research has indicated that men are more susceptible to the overconfidence bias then women (Barber & Odean, 2001). This is relevant in the finance industry, where women account for over half of total financial service workers but less than 22 percent of leadership positions (Danielecki & Ramsay, 2020). Additionally, Baker et al. (2019) find that men are more likely to exhibit the self-attribution bias than women. Overconfidence and self-attribution have been found to be significantly correlated (Czaja & Röder, 2020). However, the source of this gendered difference in overconfidence and self-attribution is debated, with some academics believing that increased investing experience increases overconfidence (Baker et al., 2019; Mishra & Metilda, 2015) while others have found quite the opposite (Gervais & Odean, 2001; Mushinada, 2020).

Demographic Variables

Groups that have experienced historical systemic discrimination, like women and people of color, are underrepresented in the finance industry, specifically in leadership roles and academic literature (Lyons-Padilla et al., 2019). However, over the past decades, women and

other demographic minorities have become increasing represented in finance, as well as other previously male-dominated industries (Danielecki & Ramsay, 2020). This rise is a result of several social movements, notably the Civil Rights and second-wave feminism movements in the mid-twentieth century, which challenged what a woman's role in society was. These movements created more equitable legislation for women in the workplace and encouraged breaking the social norms that had previously dominated the nuclear-family oriented society (Slaughter, 2012). This growing representation is important to include in research to gain a more holistic and nuanced perspective of from where and why overconfidence and self-attribution arise.

Barber and Odean's (2001) conclusions indicate that men are more overconfident than women and this irrationality results in increased trading frequency, a factor that decreases overall returns. In this sample, only 21 percent of the households examined were women. This is supportive of their conclusion in male overconfidence, but a weak part of their methodology. Baker et al. (2019) agree that men are more likely to be overconfident and exhibit the self-attribution bias than women, but temper this finding with the fact that female investors are more susceptible to herd behavior (a bias in which an individual follows group actions). This finding, as well as female propensity towards the disposition effect where investors sell high-performing assets because of risk and regret aversion, could begin to explain the lack of women in finance industry leadership roles.

There is consistent data indicating that women are stronger investors than men (Florez, 2017). However, because the overconfidence bias is one that is more socially acceptable and rewarded (Czaja & Röder, 2020), especially in male dominated industries, a more "submissive" bias like the disposition effect leads to social stigma, inhibiting female career growth. The traders who rank highly for overconfidence and self-attribution have more investors, as confidence is

often perceived as a sign of intelligence. As has been explored in prior studies, those traders are overwhelmingly male.

Experience and Education as Potential Causes

The question of how experience impacts overconfidence is one that is contested. Gervais and Odean (2001) found that overconfidence in relation to experience is shaped like a bell curve. Early traders quickly gain more confidence with early success, but then losses and further experience temper that overconfidence into a more accurate self-assessment. Consistently successful traders are the ones who are the most overconfident, as they've never had reason to readjust their self-assessment. Supporting this idea, Mushinada (2020) found that overconfidence decreased following losses and market volatility, indicating an attempt at adapting to market conditions. Mishra and Metilda (2015), on the other hand, found that increased experience actually increases overconfidence. Baker et al. (2019) found that investors who have more than two years of experience are significantly more confident than those with less than two years.

The variable of education in relation to overconfidence and self-attribution, specifically in gender differences, has been studied minimally. Additionally, past data sets have not been appropriately representative as women are increasingly represented in finance. Though the number of women included in the samples have been sufficient, it is an oversight to not have a sample that represents the population of interest. And finally, many of the most influential studies on this topic have taken place outside of the United States, specifically in India (Mishra & Metilda, 2015; Mushinada, 2020; Baker et al., 2018). This represents a significant limitation in current research. Though the United States and other European nations are far from egalitarian in terms of gender representation in finance, the cultural differences in gender expectations in India could impact these study results (Baker et al., 2018). However, even in surveys conducted in

Canada (Bhandari & Deaves, 2006), women are still proportionally underrepresented. My ultimate goal for this study is to determine a tangible path to more demographically representative leadership in the finance industry, specifically within gender representation. Given both the gaps and insights from previous research, my hypotheses are as follows:

Hypothesis 1: Men are more likely to exhibit overconfidence than women.

Hypothesis 2: Subjects with a higher level of education will be less overconfident.

Hypothesis 3: The level of relevant financial experience will decrease overconfidence level.

Hypothesis 4: Gender will weaken the effect of education on overconfidence.

Hypothesis 5: There is a gender difference in self-attribution level.

Hypothesis 6: A higher level of education will decrease self-attribution.

Hypothesis 7: The level of relevant experience will decrease self-attribution.

METHOD

Participants

The participants of this study consisted of 68 males (52.3%) and 62 females (47.7%), for a total sample size of 130. Because education is a variable of interest, the participants ranged in age, but all were at least 18 years old. The study focuses on investment decisions, so the primary population and respondents were students or investment professionals. The majority of the respondents were in some way associated with Gettysburg College, either as current students or alumni. Those respondents that were not associated with Gettysburg College were gathered through the snowball effect, where respondents asked colleagues, friends, and family to complete the survey.

Materials and Design

The participants were surveyed through a Google Form (Appendix A) with three sections, each section designed to test a different variable. The order of the questions within the three sections was randomized to control for the order effect. This survey was a within-groups design.

The first section determined overconfidence score and was modified from Mishra and Metilda's (2015) questionnaire. In this study, a participant is considered overconfident in the sense that they believe they are "better than average" in certain situations. The survey asked the respondent five behavioral questions with possible answers given in a scale from zero to 10, with zero labeled "Much worse than the average" and 10 labeled "Much better than the average". Of the five questions, three were related to finance or investing and two were standard tests of overconfidence. The participant was given an overconfidence score based on their responses to the questions. The highest score possible was 10, indicating the most overconfidence. This section isolated overconfidence as a dependent variable and, in conjunction with the demographic independent variables, allowed for testing of Hypotheses 1-4.

The second section was more complex and uses short scenarios and a series of responses to determine self-attribution. This section was modified from the Attributional Style Questionnaire (Peterson et al., 1982). Though this questionnaire was originally used to determine attributional causes of depression, its structure of a simple positive or negative scenario followed by reactive questions is appropriate for this study. The first question targeted general attribution, the second targeted self-enhancement (attributing positive scenarios to oneself), and the third targeted self-presentation (how a participant presents him or herself to others considering positive or negative scenarios). Individuals who are self-attributive would attribute negative outcomes to their environment, have a significant negative impact on their self-esteem, and

would likely not tell others. Low levels of self-attribution would have the opposite effect. The scenarios included two finance-themed questions and two generic questions, one of each being positive and one being negative. Responses were measured on a scale from zero to 10 with appropriate markings and codes indicated in Appendix A. With self-attribution as a dependent variable, testing Hypotheses 5-7 is possible.

The final section collects demographic information. The demographic information collected was gender, education level, ethnicity, and financial experience. Gender, education level, and financial experience are the primary independent variables of this study, but ethnicity was included as a standard demographic question.

Financial experience was measured through three sub-categories: years of experience, investment experience, and whether or not the respondent has a financial certificate of some kind (CFA, CPA, Series 7/63, etc). Investment experience was further divided into four options: no investment experience, passive investment experience (such as maintaining a 401k or investing in index or mutual funds), active investment experience (trading on a brokerage account), and present or prior employment in the finance industry. As respondents could select more than one option, investment experience was coded on a scale from no investment experience (0) to a combination of passive, active, and employment experience (6). Education was measured on a scale from some high school to Master's/Doctorate degree, including some college as an option. Because there were not a significant number of respondents in high school or with an Associate degree, the only education levels actually used were some college, Bachelor's degree, and Master's or Doctorate degree.

Procedure

Participants received access to the survey through personal contact, either via email or text. They were not incentivized in any way to complete the survey. The participants were selected through association with Gettysburg College and personal and professional networking. They confirmed consent prior to taking the survey and were instructed before each section in what would be expected of them. Complete instructions as well as coding information may be found in Appendix A.

RESULTS

Hypothesis 1: Men are more likely to exhibit overconfidence than women.

The first hypothesis determined whether or not the men in my sample were more likely to exhibit overconfidence than the women. Results indicated that men were significantly more overconfident on average ($M = 6.87$, $SD = 1.10$) than women ($M = 5.88$, $SD = 1.87$), $t(114) = 4.58$, $p < 0.001$ (Appendix B, Figure 1). Women are not underconfident, as their average is above 5. A confidence interval significance test confirmed this significance, 95% CI [0.56,1.41]. My first hypothesis was supported by the data set.

Hypothesis 2: Subjects with a higher level of education will be less overconfident

Though I received respondents with education ranging from some high school through Master's or Doctorate degree, I only chose to use participants who answered, "some college," "Bachelor's degree," and "Master's or Doctorate degree," as these were the categories with a large enough sample size. To determine whether education decreases overconfidence scores, I used an ANOVA test to determine significance followed by a post-hoc test to see exactly which relationships were significant. The 28 participants who only had some college education had an average overconfidence score of 5.32 ($SD = 1.93$); the 67 participants who had graduated college

with a Bachelor's degree had an average overconfidence score of 6.79 ($SD = 1.87$); and the 25

participants who completed a Master's or Doctorate degree had an average overconfidence score

of 6.68 ($SD = 1.10$) (Appendix B, Figure 2). The effect of education on overconfidence was

significant, $F(2, 117) = 16.53, p < 0.001$.

A post hoc test using independent samples t-tests to determine variance indicated

significant results between participants with some college and those who had completed college

($t(36) = 4.92, p < 0.001$) or a Master's or Doctorate degree ($t(50) = 3.50, p < 0.001$). There was,

however, no significant difference between the two higher levels of education. This does not

support the first hypothesis, as subjects with higher levels of education were more overconfident

than subject with less education, although there was no significant difference between a

Bachelor's degree or a Master's/Doctorate degree.

Hypothesis 3: The level of relevant financial experience will decrease overconfidence level.

To determine whether or not financial experience decreased overconfidence, I

operationalized experience in three ways: years of experience, whether or not the respondent had

a financial certificate, and investment experience (as explained prior). These categories were not

aggregated, as it would have been arbitrary and subjective to determine the appropriate scale or

impact of each measure on experience as a whole.

The average number of years of experience respondents had was 6.36 ($SD = 4.20$). 63

respondents, the largest group, had 10 or more years of experience, while the second largest

group was of the 24 participants who had no years of investing experience, resulting in a large

variance. A regression found a highly significant relationship between years of experience and

overconfidence, $R^2 = 0.36, F(1, 128) = 74.79, p < 0.001$ (using Adjusted R^2) (Appendix B,

Figure 3). Though this result did not support the third hypothesis and found that more years of

experience increases overconfidence, it is significant and supported by prior research.

Results indicated that those with a financial certificate were significantly more

overconfident on average ($M = 7.00$, $SD = 1.07$) than those without a financial certificate ($M =$

5.93, $SD = 1.75$), $t(128) = -5.22$, $p < 0.001$. A confidence interval significance test confirmed

this significance, 95% CI [0.66, 1.47]. The third hypothesis was not confirmed by the data using

this operation of investment experience, but the results were significant in the opposite direction

of my initial prediction.

Finally, to determine whether investment experience as an operationalized variable plays

a role in overconfidence, I ran an ANOVA test followed by a post-hoc test. The effect of

investment experience on overconfidence was significant, $F(6, 123) = 7.84$, $p < 0.001$. A post

hoc test using independent samples t-tests to determine variance indicated significant results

between participants with no or only passive investment experience and those who had

experience at or above the level of employment in the finance industry (Appendix B, Table 1).

Again, this did not support the third hypothesis, but given the presence of three significantly

related operations of financial experience, it is supported that increased levels of financial

experience increase overconfidence scores.

Hypothesis 4: Gender will weaken the effect of education on overconfidence.

This hypothesis controls for education to determine the extent of the impact of gender on

overconfidence. Using a regression, I determined that there was a significant relationship

between these variables, $R^2 = 0.20$, $F(3, 116) = 10.88$, $p < 0.001$. The effect of gender on

overconfidence was significantly lower when controlling for level of education and the

interaction between education and gender, $b(119)_{Gender} = -1.23$, $p = 0.005$. However, the inverse

was not significant, $b(119)_{\text{Education}} = 0.225$, $p = 0.43$. Although there was a significant

relationship, the fourth hypothesis as a whole is not supported because the interaction between

gender and education did not significantly impact overconfidence, $b(119)_{\text{Gender*Education}} = 0.43$, p

$= 0.24$.

Hypothesis 5: There is a gender difference in self-attribution level.

The next set of hypotheses connect the three explanatory variables to my second test

variable, self-attribution. First, determining whether there is a gender difference in self-

attribution was done using an independent samples t-test with gender as my independent variable

and the self-attribution scores (again, on a scale of zero to 10) as my test variable. Self-

attribution was a very clustered variable, with most responses around the halfway mark ($M =$

4.90, $SD = 0.72$), (Appendix B, Figure 4). Results indicated that men were significantly more

self-attributive on average ($M = 5.10$, $SD = 0.46$) than women ($M = 4.68$, $SD = 0.49$), $t(126) =$

3.43, $p < 0.001$ (Appendix B, Figure 5). A confidence interval significant test confirmed this

significance, 95% CI [0.18, 0.66]. The fifth hypothesis was supported in that there is a gender

difference in self-attribution levels, with men being more self-attributive than women.

Hypothesis 6: A higher level of education will decrease self-attribution.

I continued to use only those participants who responded, "some college," "Bachelor's

degree," and "Master's or Doctorate degree," as these were the categories with a large enough

sample size, to test education. To determine whether education decreases self-attribution scores,

I used an ANOVA test to determine significance followed by a post-hoc test to see which

relationships were significant. The participants who only had some college education had an

average overconfidence score of 4.49 ($SD = 0.48$); the participants who had graduated college

with a Bachelor's degree had an average overconfidence score of 5.00 ($SD = 0.38$); and the

participants who completed a Master's or Doctorate degree had an average overconfidence score

of 5.09 ($SD = 0.51$) (Appendix B, Figure 6). The effect of education on overconfidence was

significant, $F(2, 117) = 7.31$, $p = 0.001$.

A post hoc test using independent samples t-tests to determine variance indicated

significant results between participants with some college and those who had completed college

($t(43) = -3.48$, $p < 0.001$) or a Master's or Doctorate degree ($t(50) = -3.16$, $p < 0.001$). However,

there was no significant difference between the two higher levels of education. This does not

support the sixth hypothesis, as subjects with higher levels of education were more self-

attributive than subject with less education, although there was no significant difference between

a Bachelor's degree or a Master's/Doctorate degree.

Hypothesis 7: The level of relevant experience will decrease self-attribution.

I continued to use a non-aggregated measure of relevant financial experience in my test,

incorporating the same three variables as before. Using a regression, I determined that the years

of experience a participant had did have a significant impact on their self-attribution score, $R^2 =$

0.14, $F(1, 128) = 22.18$, $p < 0.001$ (using Adjusted R^2). Though this result did not support the

seventh hypothesis and found that more years of experience actually increases self-attribution, it

is significant and supported by prior research.

Results indicated that those with a financial certificate were significantly more self-

attributive on average ($M = 5.07$, $SD = 0.45$) than those without one ($M = 4.77$, $SD = 0.54$),

$t(125) = -2.41$, $p < 0.001$. A confidence interval significance test confirmed this significance, 95%

CI [0.05, 0.54]. Although the seventh hypothesis was not confirmed by the data using this

operation of financial experience, results were significant and interesting.

Finally, to determine whether investment experience as a measure of financial experience plays a role in self-attribution, I ran an ANOVA test followed by a post-hoc test. The effect of investment experience on overconfidence was significant, $F(6, 123) = 3.04$, $p = 0.008$. A post hoc test using independent samples t-tests to determine variance indicated significant results between participants with no or only passive investment experience and those who had experience at the level of employment in the finance industry or participants who were employed in the industry and who passively invested (Appendix B, Table 2). Again, this did not support the final hypothesis, but given the presence of three significantly related operations of financial experience, it is supported that increased levels of financial experience increase self-attributional scores.

DISCUSSION

Summary of Data and Results

All of the independent variables (gender, education, and relevant financial experience) were found to have had a significant positive effect on both test variables (overconfidence and self-attribution). Although this is not always what I hypothesized, it still bears implication for the way biases present and occur demographically and relative to adjustable variables. For the first and fifth hypotheses, I found that men are significantly more overconfident and self-attributive than women. Overconfidence scores of men fall somewhere between 0.56 and 1.41 points higher than the overconfidence scores of women (at 95% confidence); and 95% confident that self-attribution scores of men fall somewhere between 0.18 and 0.66 points higher than the self-attribution scores of women.

Education also plays a role in both overconfidence and self-attribution. Though I predicted that higher levels of education would decrease overconfidence in my second hypothesis, I found that people with a Bachelor's degree fall somewhere between 0.86 and 2.06 points higher than the overconfidence scores of people still in college; and people with a Master's or Doctorate degree fall somewhere between 0.57 and 2.12 points higher than the overconfidence scores of people still in college. I also found that education and self-attribution had a significant relationship, though in a contrary direction than I predicted in my sixth hypothesis. I found that people with a Bachelor's degree fall somewhere between 0.22 and 0.84 points higher than the self-attributional scores of people still in college; and people with a Master's or Doctorate degree fall somewhere between 0.23 and 1.01 points higher than the self-attributional scores of people still in college, to a 95 percent degree of certainty.

This does align with prior research (Bhandari & Deaves, 2006; Mishra & Metilda, 2015), but I believed that higher education, access to more knowledge and information, and the inevitable challenges that occur in academic environments would create a more accurate self-perception. This was not the case with my sample. One potential explanation for this is that working in the finance industry where both overconfidence and higher education are valued traits may have influenced the strength of this relationship. Interestingly, there was not a significant difference for either overconfidence or self-attribution past the level of a Bachelor's degree.

Although both gender and education had significant effects on overconfidence, gender (when changing from male to female) did not significantly weaken the effect of education on overconfidence. The interaction term was not significant, meaning gender does not have a moderating effect. Gender alone is significant and negative, controlling for education and gender and education as an interaction. Gender as the main effect has influence on the effect of

overconfidence; females on average were predicted to have an overconfidence score that is lower than males by 1.2 points.

Relevant financial experience as measured along all operations also increased both overconfidence and self-attribution. There was some evidence in past literature that experience, especially the experience of failure, would decrease over time (Gervais and Odean (2001) in particular, as well as Mushinada (2020)). Both studies found that investors were less overconfident following losses, as loss created a more accurate self-perception and so investors were more able to adapt to market conditions. However, the results of my study supported the theories of Mishra and Metilda (2015) and Baker et al. (2019), who determined that experience (primarily measured through years of experience) increased overconfidence. Though my third and seventh hypotheses were not supported in my study, I was able to contribute to this ongoing academic debate. I determined that with each additional year of experience, overconfidence rises by 0.2 points. 36.9 percent of variability in overconfidence can be explained with years of experience. Additionally, those with a financial certificate fell somewhere between 0.66 and 1.47 points higher than the overconfidence scores of those without a certificate. And finally, subjects with investment experience at or higher than employment in the finance industry were significantly more overconfident than those without any experience and those with passive investing experience. By every measure of experience, my third hypothesis was not supported but the relationships were found to be significant.

For experience in relation to self-attribution, each variable measured had a positive relationship. The scores for self-attribution generally were clustered around the median of 4.9, and so even if relationships were significant, it was often only by a small margin. With each additional year of experience, self-attribution rises by 0.06 points. As much as 15% of variability

in overconfidence can be explained with years of experience. Those with a financial certificate fell somewhere between 0.05 and 0.54 points higher than the self-attribution scores of those without a certificate. For the final categorization of experience, investment experience, there were not as many significant relationships for self-attribution than there were for overconfidence. However, as seen in Table 2 (Appendix B), subjects who were employed in the finance industry, were passively and actively investing, or were passively investing and employed were significantly more self-attributive than those without any experience and those with passive investing experience.

Implications

Investors who are overconfident and self-attributive are objectively worse at investing. Overconfident investors who attribute their successes to their own traits and failures to others continue to invest in speculation, often failing to diversify their portfolio appropriately or trading more frequently (Barber & Odean, 2000). Isolating at least some of the causes of this overconfidence, as well as some common characteristics of an overconfident investor, can strengthen the finance industry as a whole. By determining who are the most likely populations to be overconfident or self-attributive, intervention and continued training can be utilized in the most efficient and productive way. While this study expands on and supports the current literature, there is still much work to be done in determining the best path forward with how to minimize these biases. As behavioral finance is a relatively new perspective in a traditional field, strategies are still being developed.

Recommendations for tangible steps to avoid investment failure because of biases is a valuable area of inquiry. Corgnet et al. (2018) provide an overview and study of cognitive reflection as one such method. Cognitive reflection is the ability to think critically about

situations and reflect intentionally upon information given to come to the best solution, including

considering any behavioral or implicit biases that may be an influence. The authors' primary

suggestion is to make the investor as close to a rational actor as possible (in terms of perfect

information and methodology) by utilizing critical thinking techniques to learn the true value of

an asset. Mushinada (2020) also suggests a critical evaluation of holdings. Mushinada tracked

three steps of the investment making decision (motivation, gathering information, performing

analysis) and found that self-attribution and overconfidence are related. However, when an

investor evaluates a position more critically and comprehensively, using cognitive reflection, the

occurrence of these biases decreases.

Limitations and Further Research

Though this study was more representative in gender diversity than prior research, there

is still much room for improvement. In the methodology, the Google Form survey was self-

reported and hypothetical, making objective analysis less impactful as participants could be

prone to any number of response biases. For instance, because a portion of the survey asked

participants to imagine themselves in an undesirable situation (like being unsuccessful in a job

search, or losing money) to assess self-attribution, the survey responses could be impacted by

social desirability, prestige, or hostility bias. Though the Order Effect was controlled for as much

as possible by randomizing the order of the questions, the order of the survey as a whole

(Overconfidence to Self-Attribution to Demographics) never changed, and the order of the self-

attribution scenarios did not change either.

In order to address these potential limitations in study design, as well as to increase the

potential impact of this information, I would continue this research with a longitudinal study

using objective trade information to see how participant overconfidence and self-attribution

change over time relative to investment performance. While this study only focused on the behavioral aspects of these biases, the logical next step to further industry relevance would be to focus on investment decision-making relative to these biases.

An additional limitation of my research is in the generalizability of my sample. Because the participants were primarily Gettysburg College students and alumni, it was not diverse in terms of race and other demographic variables (socioeconomic class, age, etc.) were not collected. My sample lacked assortment and diversity, and so extrapolating conclusions to a rapidly diversifying industry is irresponsible. This is another area for future research with strong potential. Assessing other demographic variables may help isolate the causes of these biases earlier, and therefore be able to mitigate their impact on investing decisions. Another area with potential for impact in the industry is studying the relationship of overconfidence and self-attribution to leadership skills. Ultimately, the goal of this study was to determine a way to increase representative leadership in financial services. Pin-pointing where that leadership is lacking and which biases it is related to, especially on a gendered or racially diversified basis, could have great significance for that goal.

Conclusion

The findings of this study shed light on controllable variables that could help women become more represented in finance industry leadership. As overconfidence and self-attribution weaken investing decision-making, being aware of how education and experience can increase these biases is important to begin focus on interventions like cognitive reflection. These results may help decrease biases that are harmful to investors and their clients, as well as increasing representative leadership. This conclusion assumes that the finance industry is an objective meritocracy, where those with the highest returns are the employees who are promoted to

leadership. However, overconfidence is a rewarded bias in finance (Czaja & Röder, 2020). This calls into question the larger problem of what is best for finance, clients, and the economy compared to the real, irrational people within the industry. The information determined during this research brings me to this final question: Should we be encouraging women to pursue the variables that lead to increased overconfidence and self-attribution because that increases leadership opportunities, even if those very biases decrease investment performance?

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Appendix A: List of Survey Questions

"You are invited to participate in a survey about investment behavior. The survey is broken into three sections. It will take approximately 10 to 15 minutes to complete. Your information will be coded, and all responses will remain anonymous. Your participation is voluntary, and you may withdraw from the survey at any point. The survey information will be used only for my senior Capstone project at Gettysburg College. By clicking "Continue," you acknowledge that you are at least 18 years old and voluntarily consent to taking this survey.

If you have any questions, please contact Aine Ford (fordai01@gettysburg.edu) or Dr. Marta Maras (mmaras@gettysburg.edu).

Thank you for your time. Please click "Continue" to begin the survey."

The first set of questions asks you to read a prompt and rank yourself on a scale from 0 to 10.

1. Relative to other drivers, how good are you on the road?

    a. 10-point interval scale, from "much worse than average" to "much better than average"

2. How good are you at your job (either as a professional or student)?

    a. Four-point interval scale, from below average to well above average

3. How do you rate your personal level of investment?

    a. Four-point interval scale, from below average to well above average

4. How good are you (or how good do you think you could be) at investing?

    a. Four-point interval scale, from below average to well above average

5. How do you rate your ability to have predicted the rise of cryptocurrency?

    a. Four-point interval scale, from below average to well above average

The next set of questions will briefly describe four scenarios. Picture yourself in the scenario,

then answer the three following questions (Peterson et al., 1982).

1. You have been looking for a job unsuccessfully for some time.

    a. Is the cause of this scenario due to something about you or due to something

        about other people or circumstances?

        i. Ten-point interval scale, with "Completely due to other people or

            circumstances" marked and coded as 0 and "Completely due to me"

            marked and coded as 10

    b. To what extent would your self-esteem decrease or increase in this scenario?

        i. Ten interval scale, with "Greatly decrease" marked and coded as 0 and

            "Greatly increase" marked and coded as 10 (and 5 marked and coded as

            "No change")

    c. To what extent would you reveal this scenario to friends or family?

        i. Ten-point interval scale, with "Mention never" marked and coded as 0 and

            "Mention often" marked and coded as 10

2. You become very rich from a recent investment that you made.

    a. Is the cause of this scenario due to something about you or due to something

        about other people or circumstances?

     i. Ten-point interval scale, with "Completely due to other people or circumstances" marked and coded as 0 and "Completely due to me" marked and coded as 10

b. To what extent would your self-esteem decrease or increase in this scenario?

     i. Ten interval scale, with "Greatly decrease" marked and coded as 0 and "Greatly increase" marked and coded as 10 (and 5 marked and coded as "No change")

c. To what extent would you reveal this scenario to friends or family?

     i. Ten-point interval scale, with "Mention never" marked and coded as 0 and "Mention often" marked and coded as 10

3. You have done very well on an exam relevant to your degree.

a. Is the cause of this scenario due to something about you or due to something about other people or circumstances?

     i. Ten-point interval scale, with "Completely due to other people or circumstances" marked and coded as 0 and "Completely due to me" marked and coded as 10

b. To what extent would your self-esteem decrease or increase in this scenario?

     i. Ten interval scale, with "Greatly decrease" marked and coded as 0 and "Greatly increase" marked and coded as 10 (and 5 marked and coded as "No change")

c. To what extent would you reveal this scenario to friends or family?

     i. Ten-point interval scale, with "Mention never" marked and coded as 0 and "Mention often" marked and coded as 10

4. Your investment portfolio is performing poorly compared to the market.

    a. Is the cause of this scenario due to something about you or due to something about other people or circumstances?

        i. Ten-point interval scale, with "Completely due to other people or circumstances" marked and coded as 0 and "Completely due to me" marked and coded as 10

    b. To what extent would your self-esteem decrease or increase in this scenario?

        i. Ten interval scale, with "Greatly decrease" marked and coded as 0 and "Greatly increase" marked and coded as 10 (and 5 marked and coded as "No change")

    c. To what extent would you reveal this scenario to friends or family?

        i. Ten-point interval scale, with "Mention never" marked and coded as 0 and "Mention often" marked and coded as 10

The final set of questions is demographic information.

1. What is the highest degree or level of education you have completed?

    a. Some high school

    b. High school

    c. Some college

    d. Trade/technical/vocational training

    e. Associate degree

    f. Bachelor's degree

    g. Master's or Doctorate degree

2. How many years of investing experience do you have (including personal investing?)

    a. Scale from 0 to 10+

3. Please select which type of investing experience is most relevant to you (you may select more than one).

    a. Present or prior work in the finance industry

    b. Actively trading (managing your own brokerage or trading account)

    c. Passively investing (401k, working with a financial advisor, choosing mutual funds or ETFs for retirement)

    d. Not applicable

4. Do you hold any financial certifications (Master of Finance, CFA, CPA, Series 7/63, etc.)? If yes, please specify.

    a. Yes

    b. No

5. What is your ethnicity?

    b. White

    c. Hispanic or Latino

    d. Black or African American

    e. Asian/Pacific Islander

    f. Other (specify)

6. What is your gender?

    a. Male

    b. Female

    c. A gender not listed here

d.   Prefer not to say

Appendix B: Relevant Charts and Tables
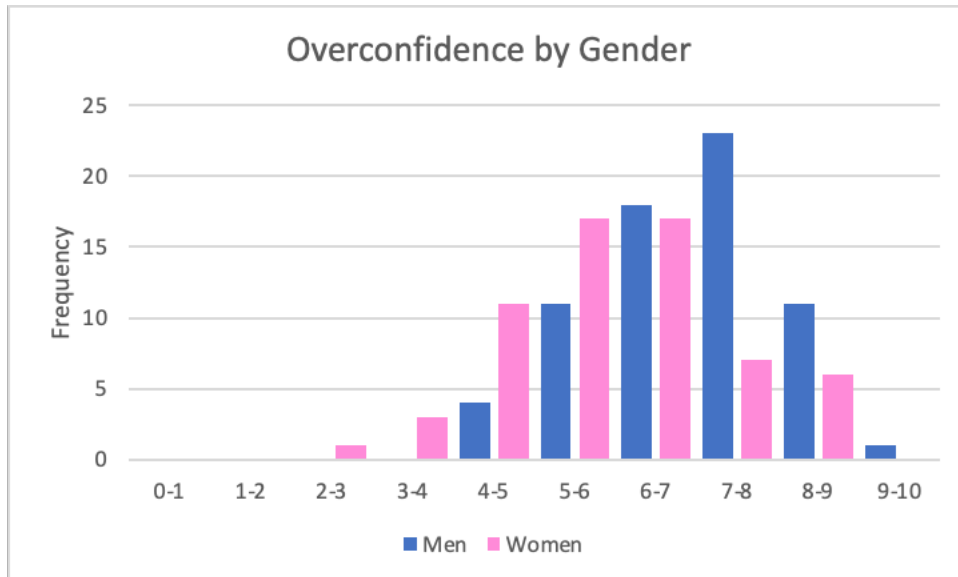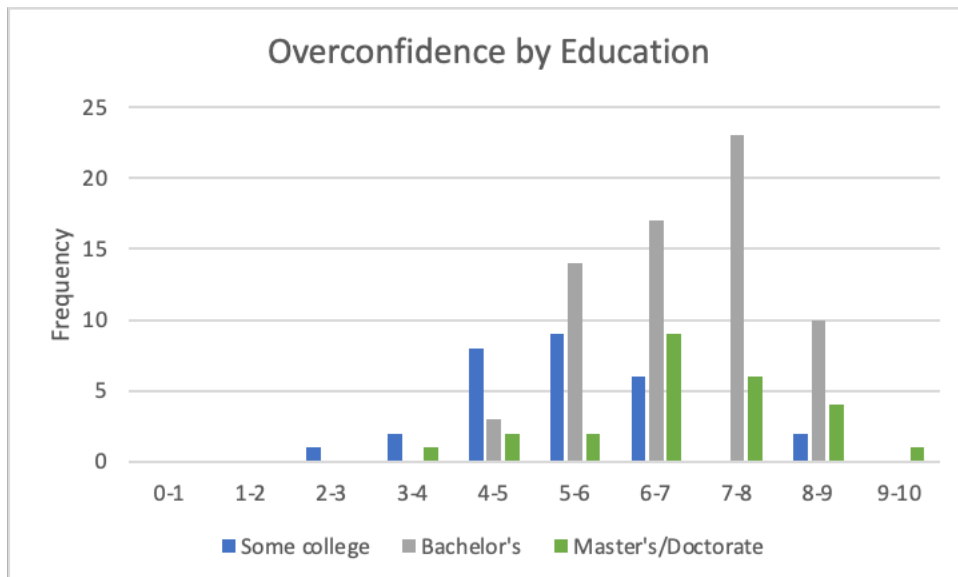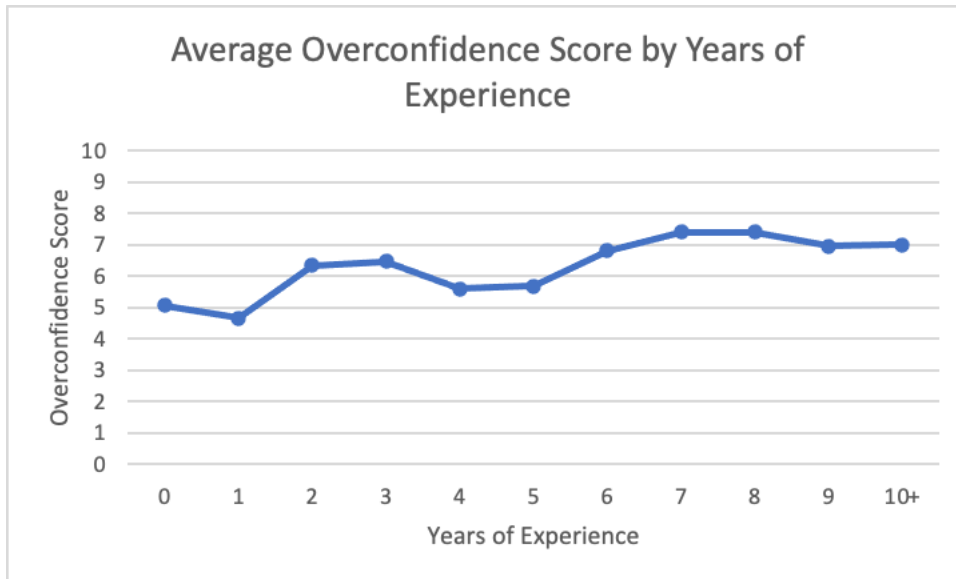
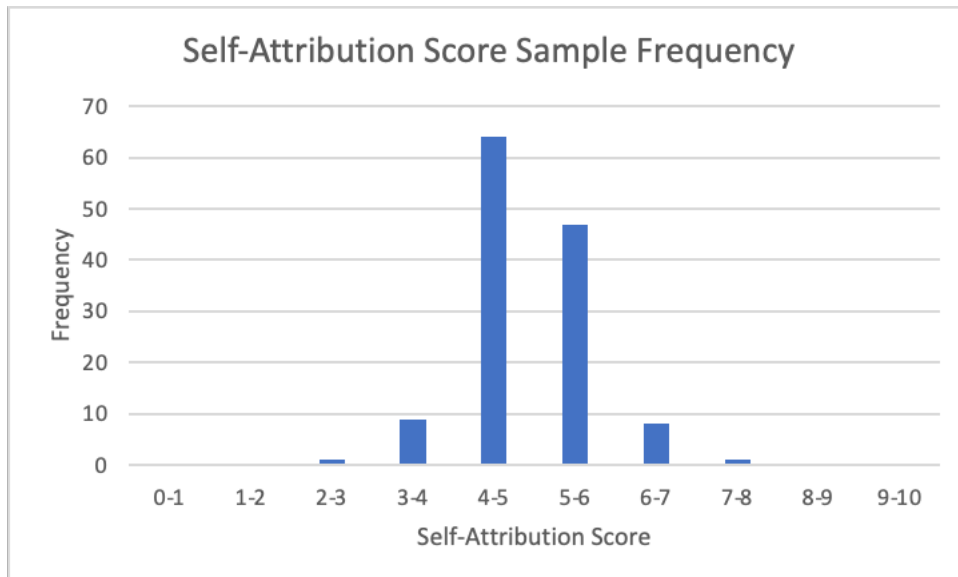

Figure 1

Figure 2

Figure 3

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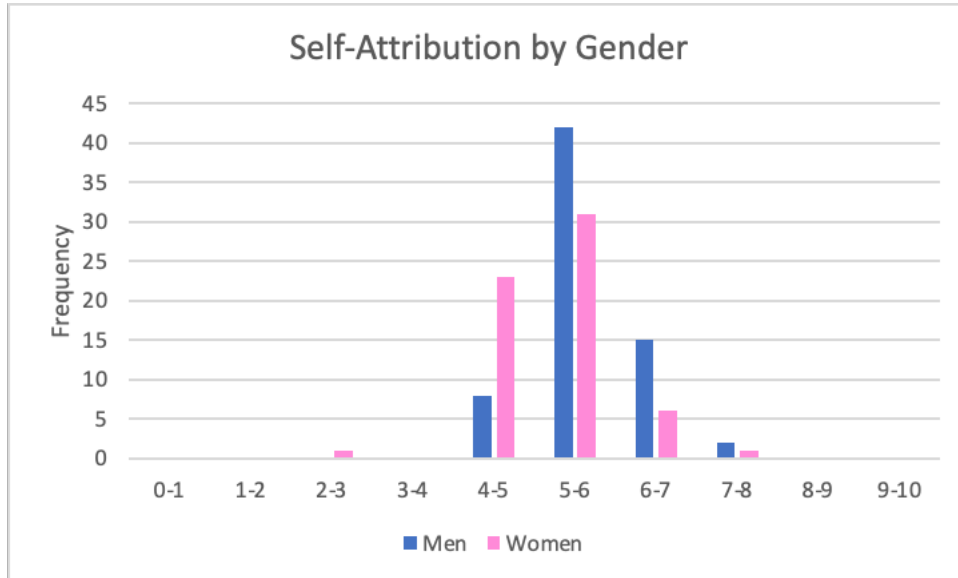
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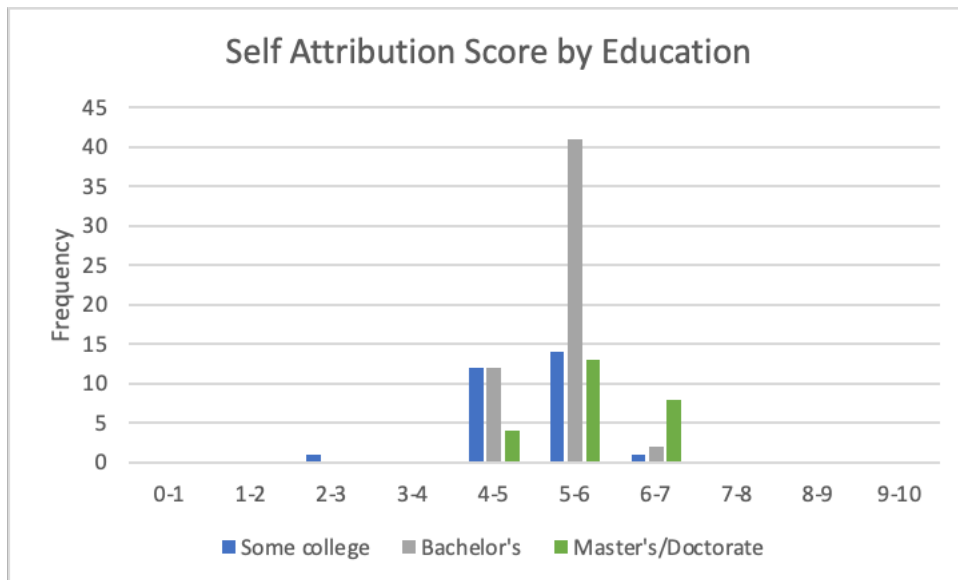
Figure 6

InvExp Overconfidence	N/A	Passive	Active	Employed, PA	P/E	A/E	P/A/E
N/A	1	1.55	1.43	5.99	4.91	3.19	6.15
Passive		1	0.69	3.62	2.77	2.02	3.84
Active			1	0.89	0.55	0.62	1.04
Employed, PA				1	-0.89	-0.28	0.39
P/E					1	0.23	1.23
A/E						1	-0.49
P/A/E							1

Table 1: Investment Experience Overconfidence Post-Hoc

The highlighted interactions show where a significant relationship occurs. For instance, respondents who are employed in the finance industry, or who engage in passive and active investing, (Employed, PA) are significantly more overconfident than respondents who have no relevant investing experience (N/A).

InvExp Self-Attribution	N/A	Passive	Active	Employed, PA	P/E	A/E	P/A/E
N/A	1	1.58	1.69	3.14	3.58	1.73	1.97
Passive		1	0.71	2.06	2.54	0.61	0.65
Active			1	0.65	0.81	-0.16	-0.27
Employed, PA				1	-0.19	-0.94	1.28
P/E					1	1.16	1.61
A/E						1	0.1
P/A/E							1

Table 2: Investment Experience Self-Attribution Score Post-Hoc

The highlighted interactions show where a significant relationship occurs. For instance, respondents who are employed in the finance industry, or who engage in passive and active investing, (Employed, PA) are significantly more self-attributive than respondents who have no relevant investing experience (N/A).