NONCOGNITIVE DETERMINANTS OF ECONOMIC OUTCOMES AND BEHAVIORS: AN EMPIRICAL AND EXPERIMENTAL ANALYSIS

by

Joshua M. Hill

A Dissertation Submitted in Partial Fulfillment
of the Requirements for the Degree of
Doctor of Philosophy in Economics

Middle Tennessee State University
August 2013

Dissertation Committee:

Dr. Mark F. Owens, Chair

Dr. Charles L. Baum

Dr. E. Anthon Eff

Dr. Adam Rennhoff

To Mrs. Reed,
I can’t wait to answer your questions.

To LeeAnn,
I am most proud of our love.

ACKNOWLEDGMENTS

I would first like to thank Mark Owens, Adam Rennhoff, Charles Baum, and Tony Eff for their training, mentoring, and patience. I cannot thank you enough for the education and advice that each of you have given me. Your scholarly pursuits have provided inspiration and a template for my own; imitation is said to be the sincerest form of flattery.

Graduate school has been a grueling experience. I would have given up long ago without the support and motivation of fellow students Christian Brown, Laron Kirby, Rob Girtz, and Wes Routon. You guys have been a great source of encouragement and even made it fun at times. I will miss the times spent in the lab chatting and complaining about anything and everything economics related. Have we learned all the econs yet?

My family has given me unwavering support throughout this process. Mom and Dad, thank you. You have given me more support and encouragement than you will ever know. At the end of all this, I look back and think of all the nights spent working on projects in elementary and middle school. I think of your constant support on helping me deal with my procrastination problems but ultimately failing. Most of all, I think of everything you sacrificed to give me a life better than your own. Regardless of everything else, that is the mark of great parents. I love you both.

I must also thank my late mother-in-law, Patricia Reed, to whom I dedicate this work. She was one of the most amazing people I ever met and was a constant supporter of pretty much anything I did. Her pride in me seemed never ending and gave me such drive. She will always be missed.

Finally, I need to thank my greatest supporter, my wife, LeeAnn. You are my best friend, my staunchest ally, and the love of my life. Every moment with you is happiness. We have been through so much over the past four years and have grown closer through every adversity. To say thank you is simply not enough. You are all I need and want in life. All is pointless without you.

ABSTRACT

An individual's decision making and life outcomes are often affected by noncognitive factors such as social skills and personality traits. A small but growing literature investigates the impact of noncognitive factors and skills on economic behavior. Over the course of three essays I utilize both econometric and experimental techniques to investigate how social skills and personality traits affect economic outcomes and decision making. The first chapter is a purely empirical study of social skills and labor market outcomes that utilizes techniques derived from the field of labor economics. The final two chapters utilize experimental methodologies developed in the fields of behavioral and experimental economics to study the link between personality and behavior in several economic games.

The first chapter investigates the impact of social networking skills on future economic outcomes. I utilize detailed social networking and labor market data drawn from the National Longitudinal Study of Adolescent Health. By controlling for a number of compounding factors and avoiding endogeneity by using past social skill proxies in empirical models of wages and education, I find that social networking skills have a significant impact on labor market outcomes. The second and third chapters utilize experimental data from a sample of one hundred twenty undergraduates from Middle Tennessee State University. The students participate in a number of economic games and complete a large battery of personality assessments. The second chapter investigates the impact of personality on risk taking behavior in the presence of responsibility by analyzing subject behavior in a variation of the stag hunt game. I find minimal support

for the hypothesis that personality heterogeneity explains differences in risk taking behavior when individuals are responsible for another's outcomes. However, I do find evidence that independent measures of risk preferences, measured using a Holt-Laury risk lottery, significantly predict a portion of observed behavior. The third chapter investigates the role personality plays in altruism and reciprocity by analyzing subject behavior in the dictator and ultimatum games. Apart from confirming previous findings, the results indicate that a number of previously unstudied personality traits play an important role in determining both altruistic behavior and negative reciprocity.

TABLE OF CONTENTS

Page

LIST OF TABLES

Page

LIST OF FIGURES

Page

INTRODUCTION

Human decision making is a black box. Information enters and a decision or behavior exits. Social scientists know some of the processes that lead to observed behaviors and outcomes. For example, the ability to think quickly, process data into usable information, and recall that information later is obviously important to decision making. However, people rely on much more than their cognitive skills to evaluate a decision.

This dissertation is composed of three essays that attempt to contribute to the large body of work uncovering the inner workings of decision making. Specifically, it investigates how two noncognitive factors, social skills and personality, affect labor market outcomes and decisions in economic games. The first essay utilizes empirical analysis on a nationally representative data set to uncover links between social skills and future labor market outcomes. The last two essays utilize experimental data to investigate the role personality plays in decision making under uncertainty.

The first chapter of this dissertation is entitled "The Effects of Social Networking Skills on Labor Market Outcomes" and investigates the impact of social networking skills on labor market outcomes. Utilizing data from the National Longitudinal Study of Adolescent Health, I am able to calculate real world social network measures for a nationally representative sample of youth. I use these measures as proxies for social skills in several empirical models of future labor market outcomes and find that they have statistically significant effects. I also find that the environment in which skills develop in adolescents dictates the skills usefulness later in life. The remainder of the dissertation focuses on the impact of personality, a different noncognitive factor, on behavior in several economic games.

The second chapter, entitled "The Noncognitive Determinants of Strategic Risk Taking: Responsibility in the Stag Hunt," investigates the impact of personality on risk taking behavior when subjects are responsible for another person's outcome. By utilizing the classic stag hunt game, I conduct a series of experiments on human subjects designed to measure their risk taking behavior when they are and are not responsible for another person's outcome. I find that risk preferences, measured using a revealed risk preference task, predict strategy choices while personality does not.

The third and final chapter, entitled "Personality, Altruism, and Reciprocity," investigates personality's role in determining behavior in two bargaining games. Subjects play the popular dictator and ultimatum games followed by completing a battery of personality trait assessments. The evidence suggests that personality does impact altruistic and reciprocal behavior. Several of the findings are similar to those in the existing literature. I also find previously unstudied correlations between a number of personality traits and reciprocal behavior.

CHAPTER I

The Effects of Social Networking Skills on Labor Market Outcomes

1.1 Introduction

Social status plays an important role in determining an individual's economic outcomes. Economic agents are surrounded by a network of friends, family, co-workers, and acquaintances who influence decision making and economic outcomes. Previous research establishes the importance of these social networks in the labor market. According to Blau and Robins (1990), roughly 30% of workers find employment through connections in their social networks. These informal connections are becoming increasingly more important in the labor market. In 2003, roughly 18% of unemployed individuals sought jobs through their social networks. In 2011, the percent of those unemployed actively using their social networks for job search increased to 28%, a 55% increase.[1] Several studies investigate the link between social network characteristics and labor market outcomes, but no attention has been given to the skills required to gain beneficial status within a social network. Individuals are not randomly assigned a certain number of friends or randomly assigned as popular among their friends, but utilize underlying social skills to gain a large number of friendships or to become popular. These skills could have a significant impact on employment decisions and outcomes.

[1]Based on average monthly data from the Current Population Survey, 2003 and 2011.

In this study, I conduct an empirical analysis of The National Longitudinal Study of Adolescent Health (Add Health) to research the impact of social networking skills on labor market outcomes. I utilize individuals' social network characteristics from secondary school to proxy for underlying social networking skills. I incorporate the proxies along with a battery of controls into several empirical models of earnings and educational attainment. I find that individuals who are more popular in adolescence, on average, experience higher earnings later in life. The earnings premium is small, but statistically significant across all specifications of the model. Since previous research establishes a strong link between social skills and occupational choice, it is also important to include occupational controls (Krueger and Schkade, 2008). Excluding the occupational controls could result in social networking skill estimates capturing differences in occupations. Estimates from models that include occupational controls are not significantly different to those from previous models. I also find that individuals with higher social networking skills are more likely to complete at least a college degree compared to their lower skilled counterparts. While these results provide evidence that social networking skills significantly impact earnings, the relationship may be more nuanced.

Development of any skill depends on several factors such as initial aptitude, environment, and heritability. Heckman (2008) finds that the development of noncognitive factors, an umbrella term under which social skills fall, depends heavily upon parental, school, and community quality. Individuals who can be popular within the context of a network composed of low achieving friends may not have the capacity to be popular with high achieving friends. If this is the case, individuals from low quality networks cannot utilize their friends in job search to achieve higher earnings. Individuals from high quality networks are more likely to be popular with high achieving friends and can utilize those friends to aid in job search. Since I measure the social networking

skill proxies using school cohort data, I utilize parental education averaged across a school's population to proxy for the quality of an individual's possible network connections. I estimate a model that allows the social networking skill's estimated effects to vary based on network quality. I find that the effect of social networking skill is positive for all groups, but only statistically significant for individuals from medium to high quality networks. Individuals from low quality networks do not receive an earnings premium from their social networking skill. The results provide evidence that social networking skills developed within the context of potentially low achieving friends are less beneficial in the labor market than the skills developed among potentially high achieving friends.

1.2 Previous Research

While cognitive abilities' effects on economic outcomes have received much attention from labor economists, researchers are just beginning to recognize the importance of noncognitive factors in the labor market. The term, noncognitive factors, refers to any aspect of an individual that is not involved in cognition. Cawley, Heckman, and Vytacil (2001) observe that social skills and other noncognitive factors affect earnings as much as cognitive abilities. There is an established and growing literature that investigates the impact of certain noncognitive factors, mainly personality, on economic outcomes.[2] Although personality receives the most attention, a small fraction of this literature empirically investigates the influence of social skills on employment decisions. Borghans et al. (2008) uncover a link between interpersonal style and occupational choice. They utilize past measures of sociability to avoid reverse causality between current occupation and social skills. They find that youth sociability sig-

[2]Almlund, Duckworth, Heckman, and Kautz (2011) provide a thorough review of the personality literature.

nificantly affects adult occupational choice. Krueger and Schkade (2008) conduct a similar study regarding gregariousness. They find that gregarious individuals tend to sort into jobs that require a high degree of social interaction. Although these studies provide evidence that social skills significantly affect labor market behavior, neither investigate their effects on earnings or education. They also utilize self-reported sociability measures or time use data that may not accurately capture true social skills. Social network analysis of observed friendship networks can provide more accurate measures of an individual's social skills.

A separate literature investigates the influences of social network characteristics on an individual's labor market outcomes.[3] Much of the work in this body of research is theoretical due to the limited data on real world social networks. Several studies theorize that social networks directly affect an individual's economic outcomes (Calvo-Armengol and Jackson, 2004; Bramoullé and Saint-Paul, 2010). Granovetter (1973) proposes one of the first links between social networks and employment. He hypothesizes that social networks consists of strong and weak connections, and individuals with more weak than strong connections experience better employment probabilities and higher wages. Tassier (2006) utilizes social network analysis to test Granovetter's hypothesis. He finds evidence to support the hypothesis but only for individuals in large social networks. Although the existing literature offers important insight into the effect of social network structure on labor market outcomes, none of the studies investigate how an individual's underlying social networking skills affect labor market decisions and outcomes.

The current study contributes to the existing literature in several ways. First, while previous studies investigate the direct link between social networks and economic outcomes, the current study utilizes social network analysis to uncover the

[3]Jackson (2008) provides an overview of the social and economic network literature.

skills or abilities that lead individuals to exhibit certain social network characteristics. Second, I find that social networking skills have a statistically significant impact on future labor market outcomes through an empirical analysis of earnings and education. Finally, I provide evidence that social networking skill's effect on future earnings is dependent on network quality. Individuals from low quality networks experience no benefit from their networking skills on annual earnings, while individuals from high quality networks experience a statistically significant earnings premium.

1.3 Data

To investigate the effects of social networking skills on earnings, I utilize the National Longitudinal Study of Adolescent Health (Add Health) (Harris, 2009). Initiated in 1994, Add Health is the largest and most comprehensive study of adolescent health and behavior (Bearman et al., 1997). The original study sampled 90,118 students in grades 7-12 from 145 secondary schools. The study attempted to sample the entire student populations from the sample schools which makes it valuable for social network analysis. Of the 90,118 students surveyed in school, 27,000 were selected to participate in in-home interviews. The Add Health study has released four waves of data and has followed 15,701 of these students into adulthood.[4]

The fourth and latest wave of data was collected between April 2007 and February 2009 when the respondents were 25-33 years old. This wave includes detailed labor market information for a large portion of the sample population. Each respondent is asked to report their income from wages, tips, or salaries from the previous year. I exclude individuals from the sample who were not employed the entire year. Table 1 contains basic summary statistics for the sample's annual earnings. The mean annual earnings are $38,991.60.

[4]The four waves of data were released in 1998, 1999, 2003, and 2009.

Add Health's unique friendship data allows me to proxy for subjects' social networking skills by utilizing past friendship ties. The first wave of the study asked students to name their five best male and five best female friends.[5] Students were allowed to nominate whom they wished, but if the friend's name did not appear on the school's roster, the friendship received a special code in the data. Specially coded friends are not used to calculate social network measures. This could limit the usefulness of the social network data, however, 96% of all first wave respondents only nominated friends included in the survey. Limiting students to list their ten closest friends may create truncated social network measures. This is not likely to be an issue with my sample since only 0.05% of individuals reported ten friends.[6] This allows for the creation of large and very detailed social networks. I calculate two popularity measures that proxy for an individual's social networking skills.

1.3.1 Social Network Analysis

The sociology literature offers a number of possible social network measures that could proxy for social networking skill. They range from simple, such as number of friends or size of network, to relatively more complex. However, not all of them are applicable to the current research question. I must be able to intuitively map some social network measure to an underlying skill. Popularity or importance within a network is an obvious first choice. Measures of popularity that focus on connections directed inward, toward an individual, are of the most importance. What is more applicable: that an individual believes he/she has many friends (outward connections), or that an individual is viewed as a friend by many people (inward connections)? In

[5]Add Health's network elicitation technique has been widely studied and validated by other scholars (Bernard et al., 1990).

[6]The average number of nominations is 5.01.

terms of social networking skills, inward measures of popularity are more intuitive proxies for social networking skills than outward measures.

To calculate the popularity measures for each individual, I first use the friendship nominations to create a social network adjacency matrix, $\mathbf{G}$. Each element of $\mathbf{G}$, g_{ij}, represents a potential link between two individuals. Since friendships are not required to be reciprocated, the direction of friendship is important. Therefore, $\mathbf{G}$, is a directed adjacency matrix where $g_{ij} = 1$ if individual i nominates person j as a friend and $g_{ji} = 1$ if and only if person j also nominates person i. If individual i does not nominate j, then $g_{ij} = 0$. I calculate two measures of popularity from $\mathbf{G}$, in-degree centrality and proximity prestige, and incorporate them into an econometric analysis of earnings and education.[7]

1.3.1.1 In-Degree Centrality

Degree centrality is a basic measure of an individual's popularity and measures how well connected an individual is within a network. For directed networks, such as the Add Health friendship network, there are two types of degree centrality: out-degree and in-degree. Out-degree is the number of people individual i nominates as friends, and in-degree is the number of people who nominate i as a friend. Individuals are not considered popular simply because they believe they have lots of friends. Individuals are considered popular because lots of people think they are a friend. Therefore, in-degree centrality is a better measurement of an individual's propensity to be popular

[7] I also conducted analysis using a number of other social networking characteristics such as density, reach, and other measures of centrality. This analysis is not reported in the current study. Several of the measures are theoretically similar to in-degree centrality or proximity prestige and produced similar results. Others are difficult to map to underlying social skills and are beyond the scope of the current study.

than out-degree centrality. In-degree centrality is calculated,

$$C_i = \frac{\sum_j \mathbf{G}_{ji}}{(n-1)}, \tag{1}$$

where $\sum_j \mathbf{G}_{ij}$ is the sum of column i in $\mathbf{G}$, and n is the total number of people in the network. In-degree centrality is the ratio of the number of people who choose to connect to individual i to all possible connections. Individuals with in-degrees equal to $(n-1)$ are nominated as a friend by every person in the network and have an in-degree centrality of $C_i = 1$. Individuals with a larger ratio are considered a friend by a larger portion of all potential friends. These individuals are more popular than those with smaller in-degree centrality measures.

Wasserman and Faust (1994) state that in-degree is a measure of receptivity or popularity. Popular individuals are likely to enjoy advantages over other job seekers since their beneficial position increases the probability that they receive useful job information. I expect individuals who have the skill to be more popular, high in-degree centrality, to experience higher earnings, on average, than individuals who are less popular, low in-degree centrality. The unidirectional aspect of in-degree centrality omits several important aspects of popularity.

1.3.1.2 Proximity Prestige

Wasserman and Faust (1994) argue that measures of prestige may be more important than measures of centrality, especially with directed networks. Prestige measures an individual's popularity by comparing the number of nominations the individual receives to the number of nominations the individual sends. The social network literature offers several possible measure of prestige, but the most comprehensive and accurate is proximity prestige.

Proximity prestige is constructed from two separate individual-level indices, influence domain and proximity (Wasserman and Faust, 1994). Individual i's influence domain is the set of people who are directly or indirectly linked to i (Lin, 1976). Define I_i as i's influence domain:

$$I_i = \sum_j \mathbf{B}_{ij}, \tag{2}$$

where $\mathbf{B}$ is the reachability matrix of the total friendship network g, such that $\mathbf{B}_{ij} = 1$ if i can reach person j through any possible path. A path is a link from person i to person j that can pass through any other individual. Proximity measures the closeness of individual i to other individuals in his/her influence domain. Define P_i as i's prestige:

$$P_i = \sum_j \frac{d(n_j, n_i)}{I_i}, \tag{3}$$

where $d(n_j, n_i)$ is the length of the shortest path between person j and person i. This index is a crude approximation of true proximity and is not comparable across social networks since it is dependent on network size.

Wasserman and Faust (1994) state that combining these two indices can provide a better measure of prestige. They suggest, based on Lin (1976), that proximity prestige be calculated,

$$PP_i = \frac{\frac{I_i}{(n-1)}}{P_i}, \tag{4}$$

where n is the size of the social network. The numerator is the fraction of individual i's influence domain to the total size of the friendship network, and the denominator is proximity. Thus, proximity prestige is a ratio of the fraction of people in a social network who can reach individual i to the average distance of those people from i. If all people in the social network are directly connected to i, then $PP_i = 1$, which

is proximity prestige's maximum value.[8] Also, if i is not reachable, then $I_i = 0$ and $PP_i = 0$. Individuals with high proximity prestige are relatively more popular than individuals with low proximity prestige. As with in-degree centrality, I expect individuals with larger proximity prestige values to experience higher earnings, holding all else constant. To investigate social networking skill's impact on economic outcomes, I include in-degree centrality and proximity prestige in several empirical models of earnings and education.

1.4 Empirical Methodology

I estimate a log earnings regression to investigate the relationship between social networking skills and earnings. The initial regression takes the form:

$$y_i = \alpha + \beta_1 \eta_i + \beta_2 \xi_i + \varepsilon_i, \tag{5}$$

where y_i is individual i's outcome of interest, η_i is one of the social networking skill proxies, and ξ_i is a set of control variables. For ease of interpretation, the social networking skill proxies are log transformed prior to estimation. Reverse causality between social networking skills and earnings could bias estimates obtained from eq. [5], however, since I utilize social network characteristics from an individual's past to proxy for social networking skills, earnings could not directly affect the proxies. To control for possible confounding factors, I include a battery of control variables: indicators for sex, race, educational attainment, marriage, age, experience, school size, cognitive ability, hours worked per week, and a set of other noncognitive factors. Cognitive ability is measured using the Add Health Picture Vocabulary Test (AH-PVT) score percentile. The AH-PVT is an abridged version of the Peabody Picture

[8] This is because, at full adjacency, all of the $d(n_j, n_i) = 1$ and $I_i = n - 1$, which results in $PP_i = 1$.

Vocabulary Test, Revised (Dunn and Dunn, 1981), which is a widely used measure of verbal IQ. The test was conducted during the wave I and III in-home interviews. I utilize the data from wave III when most participants were already in adulthood.[9] Because other noncognitive factors, such as personality, are known to influence earnings, I include a battery of noncognitive factors based on Antecol and Cobb-Clark (2011). They utilize Add Health data to investigate the impact of noncognitive factors on occupation segregation and are able to identify seven noncognitive factors in the data: self-esteem, analytical approach to problem solving, masculine traits, willingness to work hard, problem avoidance, impulsivity, and self-assessed intelligence. They are measured during the first and second wave of the Add Health study. Antecol and Cobb-Clark (2010) also include a detailed description and defense of these noncognitive factors. Table 1 contains summary statistics for the noncognitive factors. School heterogeneity may also play an important role in determining outcomes. In order to alleviate the impact of school heterogeneity on future earnings, I include a set of school dummy variables. Add Health also surveys students from seventh to the twelfth grades. It is possible that a seventh grader's social networking characteristics are not as good of a proxy for their underlying social networking skills compared to those of a twelfth grader. I include dummy variables for each respondent's wave I grade to control for grade differences at time of observation.

The Add Health study attempts to sample a nationally representative group of students, but it includes an oversample of certain racial populations and income groups. To prevent the results from being biased due to the sampling technique, I conduct weighted least squares utilizing sampling weights provided by Add Health. Because individual labor market experiences often differ based on demographic characteristics I also estimate eq. [5] on several race and sex subsamples.

[9] Verbal IQ scores should not change drastically between wave III and wave IV.

Previous research by Krueger and Schkade (2008) and Borghans et al. (2008) establish a statistically significant link between social skills and occupational choice. If more popular individuals choose higher paying occupations, any correlation between popularity and earnings may simply be a function of this choice. To investigate this possibility, I include a set of occupation dummy variables in the model. Add Health contains occupational codes based on the 2000 Standard Occupational Classification. If the result for social networking skill is capturing the effect of occupational choice, including the occupation dummies should help isolate the true effect of social networking skills on earnings.

Heckman, Stixrud, and Urzua (2006) establish a strong link between noncognitive factors and education. Social networking skills may also impact educational attainment. To investigate this possibility, I estimate an ordered probit with educational attainment as the dependent variable. There are five possible education outcomes: (1) not completing high school, (2) obtaining a high school diploma or GED, (3) obtaining a bachelor's degree, (4) obtaining a master's degree, or (5) obtaining a doctorate degree. The education data are recorded during the wave IV interview. If social networking skills significantly affect education, the estimates effects from eq. [5] are biased.

An individual's origins play an important role in determining their future economic outcomes mainly through their initial levels of cognitive and noncognitive skills (Heckman, 2008). Individuals from low performing schools or lower socioeconomic status communities may develop less human capital or develop human capital that is not beneficial in the formal labor market. Social skills, such as popularity, develop in a similar manner as cognitive abilities. Skills developed amongst low achieving individuals, who I refer to as a "low quality network," may not be beneficial in the labor market. To investigate this possibility, I estimate a model that allows the effects of

social networking skill to vary based on network quality. Since each social network is defined as a school's student population, I am able to proxy for network quality by averaging maternal educational outcomes across all students in a particular school/network. Specifically I calculate the percentage of a school's population whose mothers completed high school.[10] Low performing schools are more likely to contain families with poorly educated mothers. The empirical model takes the form,

$$\begin{aligned} y_i &= \alpha + \beta_1 \eta_i d_{bi} + \beta_2 \eta_i d_{mi} + \beta_3 \eta_i d_{ti} + \beta_4 d_{bi} \\ &\quad + \beta_5 d_{ti} + \beta_6 \xi_i + \varepsilon_i, \end{aligned} \tag{6}$$

where d_{bi}, d_{mi}, and d_{ti} are dummy variables equal to one if individual i is in the bottom, middle, or top tercile of the network quality distribution. The middle tercile dummy, d_{mi}, enters the model as $(1 - d_{bi} - d_{ti})$. The estimated parameters can then be directly interpreted as the effects for the average individual in each group. All other variables are defined as before.

1.5 Results

Table 2 reports a selection of the estimated coefficients from eq. [5]. Column (a) contains estimates from eq. [5] using in-degree centrality to proxy for social networking skill. Its estimated effect is positive and significant at the 5% level. Future earnings increase by roughly 0.54% for a 10% increase in adolescent popularity. Column (b) contains estimates from eq. [5] using proximity prestige to proxy for social networking skill. The result is quantitatively similar to in-degree centrality's effect. For an individual with mean earnings, a 10% increase in popularity results in a $273

[10] I also calculate the percentage whose mothers obtained a bachelor's degree and an index combining the mothers' high school and college data. For brevity, I do not report these results since they are qualitatively similar to those reported.

increase in annual earnings.[11] Individuals who have the ability to achieve higher social status or popularity experience slightly higher wages than individuals without this ability. Although the estimated effect is relatively small, it is statistically significant. Since previous research has uncovered a strong link between other social skills and occupational choice, the social networking skill's estimated effect may simply pick up differences in occupational choice. To investigate this, I introduce a series of occupation dummies in eq. [5]. The effects of this estimation are reported in columns (c) and (d). The estimated effects for both social networking skill proxies remain qualitatively similar and statistically significant at the 5% level. In-degree centrality's effect decreases by roughly 14% and proximity prestige's effect decreases by roughly 9%. I continue to include the occupation dummies since occupational choice should affect an individual's earnings. In order to control for school heterogeneity and possible differences in social networking skills based on grade at observation, I include school and grade dummy variables in columns (e) and (f). In-degree centrality's estimated coefficient is qualitatively similar to previous results and significant at the 5% level. The estimated coefficient for proximity prestige is still positive and significant at the 1% level. A 10% increase in proximity prestige is associated with a 0.82% increase in annual earnings.[12] The estimated effect of cognitive ability, measured using verbal IQ, is not statistically significant in any model. This may indicate multicollinearity between some of the explanatory variables, specifically between verbal IQ and educational attainment.[13] Adolescent popularity may not only affect earnings directly but may also indirectly affect earnings through some intermediate outcome such as

[11] $\$38,991.60(0.007) \approx \$273$

[12] Given annual income's summary statistics, outliers may bias results. To investigate this, I estimated models removing the bottom and top five percentiles from the earnings distribution. The results are qualitatively identical.

[13] If educational attainment is removed from the set of controls, Verbal IQ becomes statistically significant, as can be seen in in Table 5.

education. If this is the case, including educational attainment as a control in the earnings equation may result in biased estimates (Angrist and Pischke, 2008).

Tables 3 and 4 contains the estimated marginal effects from an ordered probit regression of educational outcomes. Both popularity measures produce similar results. For brevity, I only discuss the results from Table 4. Individuals with higher popularity measures are more likely to obtain at least a college degree and less likely to obtain only a high school degree or less. For a 10% increase in social networking skill, the probability of obtaining only a high school diploma decreases by about 0.45 percentage points and the probability of earning a Bachelor's degree increases by 0.4 percentage points. Since adolescent popularity significantly affects educational attainment, its estimated coefficients in Table 2 may be biased. Table 5 contains estimates from models without educational attainment controls. Social networking skill's effect on annual earnings is slightly larger compared to those in Table 2. In-degree centrality's coefficient increases by about 22% to 0.0726 and proximity prestige's coefficient increases by about 9% to 0.0893. Both estimates are statistically significant at the 1% level. Verbal IQ is positive and statistically significant at the 10% level. Past research has identified major differences in male and female labor market outcomes as well as differences based on race. Social networking skill's estimated effect on earnings may also be affected by sex and race.

Table 6 contains results from eq. [5] for certain subsamples.[14] For brevity, I choose to only report the results for models with proximity prestige.[15] Proximity prestige's estimated coefficient is positive for both males and females, and statistically significant at the 10% level for both. For males, the effect is of the same magnitude as the full sample. Proximity prestige's effect on annual earnings are quite different based on

[14]Estimated coefficients from a model with race and sex interactions instead of sample splits produce qualitatively similar results.

[15]I also conducted further analysis using in-degree centrality, but the results were similar to those for proximity prestige.

race. The estimated effect for the Caucasian subsample is positive and significant at the 1% level. Annual earnings increase by about 1.4% for a 10% increase in adolescent popularity, holding all else constant. The results for minorities are markedly different. The result for African American's is negative, but it is not statistically significant from zero. The result for the Asian sub-sample is also negative and is statistically significant at the 10% level. The estimated effect for the Hispanic subsample is positive, but not statistically significant from zero. The results for minorities seems counter-intuitive, but the estimated effects may not be a direct result of racial differences. The results may be a function of network quality rather than pure racial differences since lower performing schools contain higher proportions of minorities. Before estimating eq. [6] which takes network quality into account, it is insightful to investigate the differences between individuals from low and high quality networks.

Table 7 reports differences in means between the top and bottom half of the network quality distribution. Mean annual income is $36,339.70 for the bottom half of the distribution and $41,270.77 for the top half, a statistically significant $4,931.07 difference. The differences between social networking skill measures are small but statistically significant between the groups. Schools tend to be smaller for those in the top half of the distribution by about 206 students on average. There are also stark demographic differences between the low and high network quality populations. African Americans compose about 22% of the bottom half of the distribution and only 12% of the top half, a statistically significant difference. Hispanics also make up a much larger percentage of the bottom half of the distribution than the top half, 23% compared to 7%. This provides evidence that the results from Table 6 may not be driven by simple racial differences, but rather the differences in the development of social networking skills among high and low quality networks. As expected, individuals in higher quality networks also tend to have better educational outcomes; 39% of

individuals from higher quality schools have a college degree as their highest educational outcome compared to only 27% in lower quality schools. Given these findings, a school population's percentage of mothers with a high school diploma seems to be a valid proxy for network quality.

Table 8 reports estimated coefficients from eq. [6]. In-degree centrality's estimated effect is positive for individuals in all three groups, but is only statistically significant for the middle and top terciles. A 10% increase in social networking skills is associated with 0.8% higher annual earnings for students from medium and high quality networks. The results using proximity prestige are qualitatively similar. Again, social networking skill's estimated effect is positive across all groups, but only statistically significant for those in the middle and top network quality terciles. A 10% increase in social networking skill results in a 1.2% increase in annual earnings for those from the highest quality networks. This represents an increase of about $495.25 for this group.[16] This provides evidence that individuals who develop social networking skills within a network composed of high achieving friends benefit from this skill in the form of higher annual earnings. Individuals from low quality networks may not be able to benefit from their social networking skills for several reasons. First, their friends may not be able to provide beneficial information in job search. If an individual's friends are more likely to have low paying jobs, then any information they provide in job search would not lead to better quality job matches. Second, as with other forms of human capital, lower performing networks may not provide an individual with the appropriate social skills higher paying employers are seeking. Higher performing networks help individuals develop the social skills that are helpful in the labor market. Individuals who can be popular among a group of friends who have higher paying jobs and better economic outcomes will receive useful information in job search that

[16] Average annual earnings for this group are $41,270.77.

leads to better job matches in the form of higher earnings. Employers may also value the social skills developed within higher quality networks. Regardless of the underlying theoretical reasons for these findings, the analysis provides evidence that network quality significantly impacts social networking skill's influence on earnings.

1.6 Conclusion

Social networks play an important role in labor markets by providing information in job search. An individual's ability to achieve prestige or popularity within a network may influence the extent to which they can utilize their social networks to gain better economic outcomes. The current study offers important insight into the nuanced relationship between social networking skills and labor market outcomes that have not been previously studied. I investigate social networking skill's influence on economic outcomes by utilizing data from the National Longitudinal Study of Adolescent Health. Add Health collected detailed school network data for over 120 secondary schools in the United States. Past social network measures of popularity are likely to be highly correlated with the underlying skills required to gain popularity. Utilizing this data, I construct two proxies for social networking skill: in-degree centrality and proximity prestige. I incorporate these measures into several annual earnings and educational attainment models. I also investigate the effect of social networking skill on earnings conditional on network quality. For example, popular individuals among low achieving friends are less likely to use information provided by these friends in job search, whereas, more popular individuals among high achieving friends can utilize the information these friends provide to find better job matches.

The results from the current study indicate that social networking skill significantly affects future earnings and education. Individuals with higher measures of social networking skill experience higher earnings, holding all else constant. The

effect is relatively small, but statistically significant. This result may capture occupational differences between more popular and less popular individuals. To control for this potential confounding factor, I estimate models that include a set of occupational dummy variables and find the social networking skill's effect on annual earnings is qualitatively unchanged. I find evidence that social networking skill's effect is not constant across races. Caucasians experience an earnings premium for higher measures of popularity, but minorities do not. This finding may be a result of differences in network quality. To investigate this possibility, I allow the estimated effects of social networking skill to vary based on network quality, the potential labor market success of others in an individual's social network. Since I measure the social network characteristics using school cohorts, I am able to proxy for network quality by utilizing the school population's percentage of mothers with a high school degree. Based on differences in mean educational and earnings outcomes between those from low quality and high quality networks, mothers' educational outcomes seems to be a valid proxy for network quality. I find that individuals from high quality networks experience an earnings premium from their social networking skill, while those from lower quality networks do not. These results indicate that social networking skill development plays an important role in determining the impact that those skills have on earnings and education.

REFERENCES

[1] Almlund, M., Duckworth, A., Heckman, J., and Kautz, T. Personality psychology and economics. *National Bureau of Economic Research Working Paper* (2011).

[2] Angrist, J., and Pischke, J. *Mostly harmless econometrics: An empiricist's companion*. Princeton University Press, 2008.

[3] Antecol, H., and Cobb-Clark, D. Do psychosocial traits help explain gender segregation in young people's occupations? *Institute for the Study of Labor (IZA) Working Paper* (2010).

[4] Bearman, P., Jones, J., and Udry, J. The national longitudinal study of adolescent health: Research design, 1997.

[5] Bernard, H., Johnsen, E., Killworth, P., McCarty, C., Shelley, G., and Robinson, S. Comparing four different methods for measuring personal social networks. *Social Networks 12*, 3 (1990), 179–215.

[6] Blau, D., and Robins, P. Job search outcomes for the employed and unemployed. *Journal of Political Economy* (1990), 637–655.

[7] Borghans, L., ter Weel, B., and Weinberg, B. Interpersonal styles and labor market outcomes. *Journal of Human Resources 43*, 4 (2008), 815–858.

[8] Bramoullé, Y., and Saint-Paul, G. Social networks and labor market transitions. *Labour Economics 17*, 1 (2010), 188–195.

[9] Calvo-Armengol, A., and Jackson, M. The effects of social networks on employment and inequality. *The American Economic Review 94*, 3 (2004), 426–454.

[10] Cawley, J., Heckman, J., and Vytlacil, E. Three observations on wages and measured cognitive ability. *Labour Economics 8*, 4 (2001), 419–442.

[11] Dunn, L., and Dunn, L. Manual for the peabody picture vocabulary test-revised. *Circle Pines, MN: American Guidance Service* (1981).

[12] Granovetter, M. The strength of weak ties. *The American Journal of Sociology 78*, 6 (1973), 1360–1380.

[13] Granovetter, M. *Getting a job: A study of contacts and careers*. University of Chicago Press, 1995.

[14] Harris, K. The national longitudinal study of adolescent health (add health), waves i & ii, 1994–1996; wave iii, 2001–2002 ; wave iv, 2007-2009 [machine readable data file and documentation]. *Chapel Hill, NC: Carolina Population Center, University of North Carolina at Chapel Hill* (2009).

[15] Heckman, J. Schools, skills, and synapses. *Economic Inquiry 46*, 3 (2008), 289–324.

[16] Heckman, J., Stixrud, J., and Urzua, S. The effects of cognitive and noncognitive abilities on labor market outcomes and social behavior. *Journal of Labor Economics 24*, 3 (2006), 441–182.

[17] Jackson, M. *Social and Economic Networks*. Princeton University Press, 2008.

[18] Krueger, A., and Schkade, D. Sorting in the labor market. *Journal of Human Resources 43*, 4 (2008), 859–883.

[19] Lin, N. *Foundations of social research*. McGraw-Hill New York, 1976.

[20] Tassier, T. Labor market implications of weak ties. *Southern Economic Journal 72*, 3 (2006), 704–719.

[21] Wasserman, S., and Faust, K. *Social Network Analysis: Methods and Applications*. Cambridge University Press New York, 1994.

TABLES

Table 1: Summary Statistics

Variable	Mean	Std. Dev	Min	Max
Annual Income $	38991.60	38466.44	2.00	999995.00
Social Networking Skill Proxies				
In-Degree Centrality	0.014	0.031	0.000	0.586
Proximity Prestige	0.159	0.072	0.001	0.774
Noncognitive Factors				
Masculine Traits	13.427	2.099	7	24
Self-Esteem	50.175	6.240	20	60
Self-Assessed Intelligence	5.842	1.875	2	11
Impulsivity	11.584	2.834	4	20
Analytical Skill	15.209	2.460	4	20
Avoids Hard Problems	13.645	2.759	4	20
Works Hard	8.012	1.401	2	10

Notes: $N = 3691$. Social networking skill measures and the noncognitive factors are calculated from data collected as a part of the first wave of Add Health (1994-1997). The Verbal IQ test percentile scores are collected from the third wave. Income and all of the controls are from the fourth wave (2007-2009).

Table 1 continued: Summary Statistics

Variable	Mean	Std. Dev	Min	Max
Other Controls				
Verbal IQ	55.834	28.071	1	100
School Size	859.476	585.970	30	2559
Grade	9.377	1.464	7	12
Female	0.559	0.497	0	1
Caucasian	0.552	0.497	0	1
African American	0.163	0.369	0	1
Asian	0.051	0.221	0	1
Hispanic	0.146	0.353	0	1
Other Race	0.088	0.283	0	1
High School Diploma	0.546	0.498	0	1
College Degree	0.331	0.471	0	1
Master's Degree	0.077	0.267	0	1
Doctorate/Professional	0.023	0.150	0	1
Mother Completed HS	0.894	0.308	0	1
Mother Completed College	0.370	0.483	0	1
Married	0.452	0.498	0	1
Age	28.636	1.565	25	33
Actual Experience	8.229	3.037	0	16
Weekly Hours Worked	41.654	10.451	10	96

Notes: $N = 3691$. Social networking skill measures and the noncognitive factors are calculated from data collected as a part of the first wave of Add Health (1994-1997). The Verbal IQ test percentile scores are collected from the third wave. Income and all of the controls are from the fourth wave (2007-2009).

Table 2: Social Networking Skill's Effect on Log Annual Earnings

Variable	(a)	(b)	(c)	(d)	(e)	(f)
In-Degree Centrality	0.0537**	–	0.0461*	–	0.0595**	–
	(0.0239)		(0.0246)		(0.0247)	
Proximity Prestige	–	0.0680**	–	0.0621**	–	0.0821***
		(0.0320)		(0.0297)		(0.0277)
Verbal IQ	0.0370	0.0366	0.0257	0.0255	0.0365	0.0382
	(0.0295)	(0.0297)	(0.0292)	(0.0292)	(0.0325)	(0.0326)
Hours Worked	0.0260***	0.0261***	0.0238***	0.0238***	0.0234***	0.0236***
	(0.0020)	(0.0020)	(0.0020)	(0.0020)	(0.0023)	(0.0022)
Married	0.0705**	0.0684**	0.0450	0.0430	0.0675**	0.0651**
	(0.0326)	(0.0321)	(0.0304)	(0.0302)	(0.0293)	(0.0292)
Occupation Dummies			**x**	**x**	**x**	**x**
School Dummies					**x**	**x**
Grade Dummies					**x**	**x**
R^2	0.230	0.231	0.267	0.268	0.318	0.320

Notes: $N = 3691$. Social networking skill proxies are log transformed. Robust standard errors are in parentheses. Estimation is conducted using sampling weights and also controls for stratification and clustering. All models also include controls for noncognitive traits, school size,sex, race, age, and experience. The full set of results are available upon request. Legend: *denotes significant at the 10% level, **denotes significant at the 5% level, and ***denotes significant at the 1% level

Table 2 continued: Social Networking Skill's Effect on Log Annual Earnings

Variable	(a)	(b)	(c)	(d)	(e)	(f)
High School	0.6398**	0.6417**	0.5958**	0.5982**	0.5573**	0.5610**
	(0.2518)	(0.2513)	(0.2395)	(0.2396)	(0.2544)	(0.2538)
College	0.9976***	0.9965***	0.9458***	0.9459***	0.8814***	0.8849***
	(0.2381)	(0.2364)	(0.2344)	(0.2331)	(0.2546)	(0.2520)
Master's	1.0814***	1.0856***	1.0434***	1.0477***	1.0094***	1.0136***
	(0.2458)	(0.2425)	(0.2383)	(0.2356)	(0.2505)	(0.2480)
Ph.D/Professional	0.9908***	0.9916***	0.8765***	0.8783***	0.8012***	0.8087***
	(0.2906)	(0.2891)	(0.2736)	(0.2738)	(0.2872)	(0.2846)
Mother HS	0.1755**	0.1728**	0.1683**	0.1653**	0.1744*	0.1734*
	(0.0805)	(0.0805)	(0.0816)	(0.0815)	(0.0897)	(0.0900)
Mother College	0.0215	0.0237	0.0340	0.0355	0.0301	0.0319
	(0.0483)	(0.0482)	(0.0482)	(0.0480)	(0.0470)	(0.0470)
Occupation Dummies			**x**	**x**	**x**	**x**
School Dummies					**x**	**x**
Grade Dummies					**x**	**x**
R^2	0.230	0.231	0.267	0.268	0.318	0.320

Notes: $N = 3691$. Social networking skill proxies are log transformed. Robust standard errors are in parentheses. Estimation is conducted using sampling weights and also controls for stratification and clustering. All models also include controls for noncognitive traits, school size,sex, race, age, and experience. The full set of results are available upon request. Legend: *denotes significant at the 10% level, **denotes significant at the 5% level, and ***denotes significant at the 1% level

Table 3: Social Networking Skill's Effect on Educational Attainment Measured Using In-Degree Centrality

Variable	No HS Diploma	HS Diploma	College Degree	Master's	Doctoral/Professional
In-Degree Centrality	-0.0022***	-0.0826***	0.0708***	0.0122***	0.0019***
	(0.0006)	(0.0140)	(0.0125)	(0.0022)	(0.0005)
Verbal IQ	-0.0030***	-0.1115***	0.0956***	0.0164***	0.0026***
	(0.0008)	(0.0166)	(0.0144)	(0.0029)	(0.0007)
Masculine Traits	-0.0056**	-0.2073***	0.1776***	0.0305***	0.0048***
	(0.0023)	(0.0666)	(0.0578)	(0.0098)	(0.0018)
Self-Esteem	-0.0041*	-0.1496**	0.1282**	0.0220**	0.0035*
	(0.0021)	(0.0732)	(0.0633)	(0.0105)	(0.0018)
Self-Assessed Intelligence	0.0090***	0.3325***	-0.2848***	-0.0489***	-0.0077***
	(0.0022)	(0.0350)	(0.0316)	(0.0063)	(0.0019)
Impulsivity	0.0071***	0.2598***	-0.2226***	-0.0382***	-0.0060***
	(0.0023)	(0.0422)	(0.0364)	(0.0078)	(0.0017)
Mother Completed HS	-0.0060**	-0.1306***	0.1185***	0.0159***	0.0022***
	(0.0025)	(0.0346)	(0.0330)	(0.0038)	(0.0007)
Mother Completed College	-0.0043***	-0.1946***	0.1594***	0.0335***	0.0061***
	(0.0011)	(0.0209)	(0.0176)	(0.0047)	(0.0015)

Notes: Reported estimates are marginal effects from an ordered probit with educational attainment as the dependent variable. $N = 3691$. Robust standard errors are in parentheses. Estimation is conducted using sampling weights and also controls for stratification and clustering. All models also include a battery of noncognitive traits, school size, a sex dummy variable, race dummy variables, school dummies, and grade dummies. Full results are available upon request. Legend: *denotes significant at the 10% level, **denotes significant at the 5% level, and ***denotes significant at the 1% level

Table 4: Social Networking Skill's Effect on Educational Attainment Measured Using Proximity Prestige

Variable	No HS Diploma	HS Diploma	College Degree	Master's	Doctoral/Terminal
Proximity Prestige	-0.0013**	-0.0446***	0.0380***	0.0068***	0.0011***
	(0.0005)	(0.0139)	(0.0121)	(0.0021)	(0.0004)
Verbal IQ	-0.0032***	-0.1109***	0.0946***	0.0168***	0.0027***
	(0.0009)	(0.0167)	(0.0144)	(0.0031)	(0.0007)
Masculine Traits	-0.0052**	-0.1794***	0.1529***	0.0272***	0.0044**
	(0.0023)	(0.0657)	(0.0567)	(0.0099)	(0.0018)
Self-Esteem	-0.0041*	-0.1438**	0.1226*	0.0218**	0.0035*
	(0.0022)	(0.0719)	(0.0619)	(0.0106)	(0.0018)
Self-Assessed Intelligence	0.0098***	0.3398***	-0.2898***	-0.0515***	-0.0083***
	(0.0024)	(0.0352)	(0.0316)	(0.0065)	(0.0020)
Impulsivity	0.0073***	0.2538***	-0.2164***	-0.0385***	-0.0062***
	(0.0024)	(0.0414)	(0.0355)	(0.0079)	(0.0017)
Mother Completed HS	-0.0061**	-0.1277***	0.1154***	0.0162***	0.0023***
	(0.0025)	(0.0343)	(0.0326)	(0.0038)	(0.0007)
Mother Completed College	-0.0048***	-0.2023***	0.1643***	0.0360***	0.0067***
	(0.0012)	(0.0212)	(0.0176)	(0.0050)	(0.0016)

Notes: Reported estimates are marginal effects from an ordered probit with educational attainment as the dependent variable. $N = 3691$. Robust standard errors are in parentheses. Estimation is conducted using sampling weights and also controls for stratification and clustering. All models also include a battery of noncognitive traits, school size, and maternal educational outcomes. Legend: *denotes significant at the 10% level, **denotes significant at the 5% level, and ***denotes significant at the 1% level

Table 5: Estimates of eq. [5] Without Education Controls

	(a)	(b)
In-Degree Centrality	0.0726***	–
	(0.0253)	
Proximity Prestige	–	0.0893***
		(0.0272)
Verbal IQ	0.0611*	0.0628*
	(0.0335)	(0.0336)
Hours Worked	0.0245***	0.0248***
	(0.0023)	(0.0023)
Mother Completed HS	0.1992**	0.1976**
	(0.0877)	(0.0880)
Mother Completed College	0.0710	0.0739
	(0.0450)	(0.0451)
R^2	0.298	0.300

Notes: $N = 3691$.Robust standard errors are in parentheses. All models also include a battery of noncognitive traits, school size, and maternal educational outcomes. Estimation is conducted using sampling weights and also controls for stratification and clustering. Only variables of interest are presented. Legend: *denotes significant at the 10% level, **denotes significant at the 5% level, and ***denotes significant at the 1% level

Table 6: Social Networking Skill's Effect on Annual Earnings for Race and Sex Subsamples

Variable	Male	Female	Caucasian	African American	Asian	Hispanic
Proximity Prestige	0.0930***	0.0712**	0.1376***	-0.0540	-0.1403**	0.0173
	(0.0328)	(0.0327)	(0.0403)	(0.0540)	(0.0556)	(0.0336)
Verbal IQ	0.0722	0.0838*	0.0034	0.2019***	-0.0835	0.0673
	(0.0481)	(0.0453)	(0.0488)	(0.0668)	(0.0620)	(0.0532)
Hours Worked per Week	0.0209***	0.0232***	0.0251***	0.0286***	0.0196***	0.0179***
	(0.0033)	(0.0029)	(0.0030)	(0.0072)	(0.0042)	(0.0045)
Female	–	–	-0.1668**	-0.2203	-0.1208	0.0163
			(0.0815)	(0.1412)	(0.0949)	(0.1058)
African American	-0.2806**	-0.1284	–	–	–	–
	(0.1207)	(0.0816)				
Asian	-0.0422	0.2732**	–	–	–	–
	(0.1320)	(0.1050)				
Hispanic	-0.1874*	0.1952*	–	–	–	–
	(0.1069)	(0.1160)				
Married	0.2875***	-0.1300***	0.0816**	0.0508	0.4114***	-0.0915
	(0.0416)	(0.0473)	(0.0372)	(0.1232)	(0.1073)	(0.0909)
Mother Completed HS	0.0942	0.2822**	0.2567**	0.2243	0.2663*	0.2329**
	(0.0892)	(0.1191)	(0.1287)	(0.1546)	(0.1301)	(0.1165)
Mother Completed College	0.0490	0.0965	0.1373***	-0.2250	-0.2750***	-0.0950
	(0.0543)	(0.0674)	(0.0521)	(0.1397)	(0.0736)	(0.1112)
R^2	0.403	0.327	0.347	0.416	0.835	0.462
N	1620	2051	2027	598	190	535

Notes: Robust standard errors are in parentheses. Estimation is conducted using sampling weights and also controls for stratification and clustering. All models also include a battery of noncognitive traits, school size, school dummies, and grade dummies. Legend: ∗denotes significant at the 10% level, ∗∗denotes significant at the 5% level, and ∗ ∗ ∗denotes significant at the 1% level

Table 7: Differences in Means by Network Quality

Variable	Low	High	Difference
Annual Income	36339.6958	41270.7657	-4931.0700***
			[-3.8903]
In-Degree Centrality	0.0113	0.0161	-0.0047***
			[-4.7261]
Proximity Prestige	0.1495	0.1672	-0.0177***
			[-7.5289]
School Size	970.3030	764.2267	206.0763***
			[10.8187]
African American	0.2181	0.1154	0.1027***
			[8.5045]
Caucasian	0.4074	0.6756	-0.2682***
			[-16.9534]
Asian	0.0639	0.0408	0.0231***
			[3.1680]
Hispanic	0.2327	0.0720	0.1607***
			[14.1346]
Mother Completed HS	0.8271	0.9511	-0.1241***
			[-12.4459]
Mother Completed College	0.2749	0.4514	-0.1765***
			[-11.2582]
High School	0.6372	0.4680	0.1692***
			[10.4393]
College	0.2685	0.3854	-0.1169***
			[-7.5807]
Master's	0.0498	0.1008	-0.0509***
			[-5.8042]
Ph.D/Professional	0.0106	0.0338	-0.0232***
			[-4.6981]
N	1706	1985	

Notes: T-stats are in brackets. *denotes significant at the 10% level, **denotes significant at the 5% level, and ***denotes significant at the 1% level

Table 8: Social Networking Skill and Network Quality Interactions

Variable	In-degree Centrality	Proximity Prestige
Bottom Tercile	0.0556	0.0544
	(0.0573)	(0.0471)
Middle Tercile	0.0802*	0.0920*
	(0.0422)	(0.0502)
Top Tercile	0.0777**	0.1171***
	(0.0309)	(0.0286)
R^2	0.298	0.300

Notes: $N = 3691$. Robust standard errors are in parentheses. Estimation is conducted using sampling weights and also controls for stratification and clustering. Column (a) presents estimates of eq. [8] with in-degree centrality and column (b) estimates eq. [8] with proximity prestige. Both models include the full set of controls excluding educational attainment. Legend: *denotes significant at the 10% level, **denotes significant at the 5% level, and ***denotes significant at the 1% level.

CHAPTER II

The Noncognitive Determinants of Strategic Risk Taking Behavior: Responsibility in the Stag Hunt

2.1 Introduction

People often make decisions that directly impact the outcomes of others not involved in the decision making process. For example, parents make decisions that have long term consequences for their children. Retirement fund managers make investment decisions without the input of those whose retirement funds are affected. Banks often make investment decisions that directly affect client outcomes. This type of decision making is prevalent, yet has received little attention in the experimental economics literature.

The majority of studies that investigate decision making in the presence of uncertainty only analyze the decisions of a player who is responsible for his/her own outcomes.[1] A small number of papers in the literature focus on the role of responsibility in decision making. Charness and Jackson (2009) investigate the impact of responsibility on strategic behavior in a stag hunt game. They find that a portion of individuals tend to adjust their strategies when responsible for another person's outcomes compared to when they are only responsible for their own outcomes. Several studies also investigate whether individuals are likely to become more cautious

[1] DellaVigna (2009) provides a thorough overview of this literature.

or more risky in their decision making when responsible for others with mixed results (Reynolds et al., 2011). All of these studies attempt to uncover how individuals react to responsibility but do not focus on why individuals react as they do. The current study investigates the determinants of risk taking behavior in the presence of responsibility. We are specifically interested in the influence of noncognitive factors, such as personality, on changes to risk taking behavior.

We utilize an experimental design similar to Charness and Jackson (2009) and find similar results. Individuals play two rounds of the stag hunt. In one round they play the traditional stag hunt and in the other round subjects are told that they are responsible for the outcome of a silent teammate. We also ask subjects to answer a battery of personality assessments in order to determine whether personality plays a role in predicting changes in risk taking behavior. Subjects are asked to particiapte in a Holt-Laury risk lottery which measures individual risk preferences outside of the stag hunt setting. We find minimal support for the influence of personality traits on changes in risk taking behavior when responsibility is introduced. This is counter to our ex ante predictions. We also find that risk preference measures, such as the Holt-Laury risk lottery, are strongly correlated with behavior in the stag hunt when played individually and in the presence of responsibility. Risk averse individuals tend to play the low risk strategy in both rounds and are much more likely to switch from playing the high risk strategy when playing for self to playing the low risk strategy under responsibility. We also find that order of play is a significant predictor of behavior. Half of our sample played for themselves in the first round and the other half played under responsibility in the first round. Individuals who play under responsibility first are much more likely to play the high risk strategy under responsibility and switch to the low risk strategy when playing for self. We hypothesize that the order of play may create a significant focussing effect or anchor point. Individuals who play for self first

may focus on the responsibility aspect of the play for pair game and subsequently be less likely to play the riskier strategy when responsible for another person's outcome. In contrast, subjects who starts out responsible for another individual may not be as aware of the responsibility aspect of the game until after they switch to playing the play for self game.

The paper is organized as follows. Section 2 provides a brief overview of the existing literatures on personality and risk taking in the experimental economics laboratory. Section 3 discusses the experiment design and methodology. Section 4 provides a detailed description of each personality trait. Section 5 discuses the results of our study and how they relate to or differ from existing findings.

2.2 Previous Research

This study builds on the work of two separate strands in the experimental economics literature: the literature on personality's impact on decision making and the literature on risk preferences.

2.2.1 Personality and Behavior in Laboratory Experiments

A growing literature investigates the impact of noncognitive traits, especially personality, on decision making behavior in experimental games. There are a large number of available personality trait instruments developed by social and personality psychologists. Because many of the same traits could be of interest to economists, it stands to reason that personality traits might be correlated with responses in economic contexts. However, relatively few studies have found evidence linking personality measures to decision making in the context of experimental games. Boone et al. (1999), one of the first studies in the literature, find that individuals with certain per-

sonality traits are more likely to exhibit cooperative behavior in prisoner's dilemma games. Of these, self-monitoring plays an important role in determining decisions and outcomes. Gunnthorsdotter, McCabe, and Smith (2002) find that an instrument for Machiavellian tendencies is able to predict behavior in trust games. They also find that there is no difference in behavior between males and females once personality traits are included in their analysis. Schmitt et al. (2008) use the Myers-Briggs Type Indicator (MBTI) to investigate determinants of play in ultimatum games. They find that an individual's type, as indicated by the MBTI, has a significant impact on behavior in the ultimatum game. Several studies utilize the popular five-factor model of personality. Ben-Ner et al. (2004) find that several of the personality traits measured using the five-factor model significantly affect play in dictator games. They also argue that personality traits may explain a significant portion of the variation in behavior economics laboratory experiments that typically remain unexplained by economists. Biais et al. (2005) utilize the Snyder self-monitoring scale to determine trading behavior in an asset market experiment. They find that self-monitoring improves performance in the market and that its effect is significant for men but not for women.

2.2.2 Risk Preferences in Laboratory Experiments

Individuals' decision making under uncertainty has received much attention in experimental economics. Individual risk preferences have received much attention in the literature. Holt and Laury (2002) find that, when faced with a choice of risky gambles, individuals tend to be more risk averse than previous theories would predict. Several studies observe similar risk preferences under a number of different experimental designs (Harrison et al., 2005; Chakravarty et al., 2005).

A growing literature also investigates the influence of responsibility on risk preferences. Economic agents often make decisions that not only affect their outcomes, but directly affect the outcomes of people for whom they are responsible. Several studies hypothesize that an individual will shift their risk preferences when in a group. Stoner (1961) proposes the terms risky shift and cautious shift to describe this phenomenon. An individual either becomes less risk averse when in a group or more risk averse.

While several theories explain differences between individual behavior in isolation and in a group, no theories have been proposed to explain differences in behavior when an individual is responsible for others. Several experimental studies provide evidence that individuals tend to exhibit a cautious shift in risk preferences when responsible for other people's outcomes (Charness, 2000; Kerr and MacCoun, 1985). Reynolds et al. (2009) find that individuals are more risk averse when they are responsible for others and experience a cautious shift when responsible for other players' outcomes. Pahlke, Strasser, and Veider (2010) find evidence disputing the cautious shift hypothesis. Using a similar experimental design, they introduce risky decisions with gains and losses. They find that people behave differently when facing decisions that could result in gains versus decisions that could result in a loss. They conclude that traditional loss aversion holds under responsibility. Charness and Jackson (2009) investigate a similar question using Rousseau's classic stag hunt. Participants play a simultaneous move game against another player where they choose to hunt either a stag or a hare. The stag hunt has been used in a number of applications, particularly the evolution of social structure (Skyrms, 2003) Hunting hare results in a smaller, but more certain payoff than hunting stag. Hunting stag may result in a larger payoff if both players choose to hunt stag. The first round of play is simply the traditional stag hunt. The second round, as in Reynolds et al. (2009), introduces a silent second party who is affected by each player's decisions. The silent second party receives the same

payoff as his/her active partner. They find that players are 18 percentage points more likely to choose Stag when choosing solely for their own payoffs as opposed to being responsible for another silent player. They also find that about one-third of their sample is sensitive to the introduction of responsibility in the game. They suggest three possible forces that may affect behavior: (1) concern over how the other group member might react, similar to guilt aversion in Charness and Dufwenberg (2006), (2) players genuinely care about the other group member, but believe that he or she likes risk more than the average person, and (3) players are "socialized" to believe they should be more cautious when in a position of responsibility. If a combination of these forces applies, then people will be less risky when responsible for another's outcome. Even though they suggest several reasons that individuals behave differently under responsibility, they are unable to create testable hypotheses with their data to uncover the determinants of play. The current paper utilizes noncognitive traits, specifically personality traits, to uncover why individuals' risk taking preferences may change when they are responsible for other's outcomes.

2.3 Experimental Design

120 subjects were recruited via email to participate in five different experimental sessions. They received a $7.00 show up fee plus earnings based on their decisions in the experiment. Total payoffs, including the show up fee, averaged $28.35 for a session lasting approximately one hour and 45 minutes. Once all participants arrived for a session and their identities were verified, they were randomly divided into two groups. One group was then moved to another room. All games were played against anonymous partners and at no point did any participant know the identity of their partner or opponent. Each group, led by one of the experimenters, then played two rounds of a stag hunt game.

Rousseau briefly describes a story in *A Discourse on Inequity* which forms the basis of the stag hunt:

> *If it was a matter of hunting deer, everyone well realized that he must remain faithful to his post; but if a hare happened to pass within reach of one of them, we cannot doubt that he would have gone off in pursuit of it without scruple, and, having seized his prey, cared very little, if by so doing he caused his companions to miss theirs.*

The stag hunt represents a problem of social cooperation in which participants simultaneously choose between hunting stag or hunting hare. Cooperation results in the Pareto optimal outcome with both players choosing to hunt the stag. However, this payoff is not guaranteed. If both choose to defect from the socially optimal strategy, they both receive a smaller, but identical payoff. If one player chooses the non-cooperative strategy (hare) and the other chooses the cooperative strategy (stag), then the non-cooperative player receives a higher payoff, and the cooperative player receives a lower payoff. In the context of Rousseau's original story, the hunter who chooses to hunt for the stag alone will not be able to benefit from the help of the other hunter and will fail to receive the maximum payoff. The hunter who hunts for the hare will be able to easily capture the hare without the help of the other hunter. The specific payoffs used in our study are:

		Player B	
		Stag	Hare
Player A	Stag	5 , 5	1 , 4
	Hare	4 , 1	4 , 4

The stag hunt differs from the prisoner's dilemma since there are two pure strategy Nash equilibria: both players hunt stag and both players hunt hare. Both players hunting the stag Pareto dominates all other strategies. However, there is more risk in

choosing to hunt the stag since a player who chooses stag runs the risk of receiving $1 as opposed to the guaranteed payoff of $4 from hunting the hare. The non-cooperative equilibrium is risk-dominant and the cooperative equilibrium is payoff-dominant. As in Charness and Jackson (2009), we take the stag hunt one step further by introducing responsibility.

In our experiment, individuals play two rounds of the stag hunt. In one round, individuals are told that they must choose between two options, A or B, and their payoff depends on their choice and the choice of an anonymous, randomly assigned opponent. Using the terminology of Charness and Jackson (2009), we refer to this round as the "play for self" (PFS) game. In the other round, individuals play a variation of the same game. Participants are told that they have the exact same choices and possible payoffs, but are now responsible for the outcomes of an anonymous, inactive teammate. The teammate has no decision making responsibilities and simply receives the same payoff as the decision maker. We refer this as the "play for pair" game. Half of the participants played the PFS game first and the other half played the PFP game first. Each round is a one-shot game and experimenters collected answer sheets that contained the decisions. The participants were then matched with their opponent's answers to determine payoffs.

Charness and Jackson (2009) find that introducing responsibility significantly affects the decisions for a portion of their sample. We attempt to add to their findings by investigating the determinants of individual's strategic choices and the determinants of the affect of responsibility on their choices. To do this, individuals also participated in risk lottery to determine risk preferences and were asked to complete a series of psychological assessments intended to measure various aspects of their personality.

2.3.1 Risk Preferences

In order to measure risk preferences, we conducted a Holt-Laury risk lottery (Holt and Laury, 2002). Individuals make ten decisions between paired lotteries, option A and option B. The lotteries are identical to Holt and Laury (2002) and can be found in the appendix. For the first decision, option A results in a gamble in which the player earns \$2.00 or \$1.60 and option B results in a gamble in which the player earns \$3.85 or \$0.10. For both gambles, the probability of the higher payoff is $\frac{1}{10}$. At each sequential decision, the probability of the higher payoff increases by $\frac{1}{10}$. For the last decision the gambles pay either \$2.00 or \$3.85 with one hundred percent certainty. This design allows us to easily measure risk preferences for each participant independent of their play in the stag hunt. Risk neutral players choose option A four times before switching to option B for the remainder of their decisions. The most risk-averse person should only switch to option B at the tenth decision and the most risk-loving person should choose option B every time. One possible criticism of this game is the low real payoffs that each participant faces. Holt and Laury (2002) conduct experimental sessions with payoffs as high as ninety times the payoffs we use. They find that individual risk preferences are very similar regardless of payoff size.

2.4 Personality Traits

2.4.1 Five Factor Model

The five factor model of personality is used extensively in the personality psychology literature to summarize the main factors on which individual personalities differ. The five factors are neuroticism, extraversion, openness, agreeableness, and conscientiousness. Costa and McCrae (1985) develop a concise assessment tool that measures each of these factors, the NEO personality inventory. The inventory consists

of sections of questions aimed at measuring each of the five factors and a series of sub-factors for each trait. A shorter, revised assessment called the NEO-Five Factor Inventory, NEO-FFI, was created in 2004 to shorten the amount of time required to complete the assessment (Costa and McCrae, 2004). One of the main benefits of Costa and McCrae's assessment is the ability to measure the five factors independently of the each other as well as a number of sub-factors for each trait. This allows analysis using the five factor model to become much more detailed and rich.

Neuroticism is a measure of emotional stability that is characterized by anxiety, moodiness, worry, envy, and jealousy (Thompson, 2008). It is important to note that, like the other big five personality traits, neuroticism is considered a continuous dimension rather than an indicator of a type of person. Individuals may fall anywhere on the spectrum from high to low neuroticism. The NEO-FFI measures six sub-factors that are combined to calculate an individual's neuroticism score: anxiety, hostility, depression, self-consciousness, impulsiveness, and vulnerability to stress. Individuals with high neuroticism scores are more likely than the average person to experience emotionally unstable feelings. High neurotics are likely to experience high degrees of anxiety, envy, or guilt. They also respond poorly to changes in the environment, are often self-conscious, and they may have trouble delaying gratification. On the other end of the spectrum, individuals with low neuroticism scores are more emotionally stable and less anxious. Though these individuals are less inclined to experiencing negative emotions, they are not more inclined to experience positive emotions. Low neurotics simply respond in a less negative way to stressful situations. An individual's propensity toward positive emotions is captured by extraversion.

Extraversion measures the extent to which an individual is interested in external objects. Traditionally, extraversion and introversion are used to classify how a person interacts socially. While this may be a result of an individual's inclination toward

extraversion, it is not extraversion in and of itself. As with neuroticism, extraversion is measured on a spectrum rather than being an indicator of types. The NEO-FFI also measures six sub-factors: warmth, gregariousness, assertiveness, activity, excitement seeking, and positive emotion. High extraverts are concerned with obtaining gratification from what is outside the self. This often manifests in the form of social interactions. They tend to be gregarious, enthusiastic, assertive, are energized by large crowds, and are bored when by themselves (Thompson, 2008). They are also more prone to experience positive emotions than the average person. Individuals with low extraversion scores tend to be more concerned with their own mental life. They typically prefer to interact with themselves rather than other people. They enjoy time spent alone and may be uncomfortable with large crowds. Extraversion strictly applies to whether an individual seeks gratification outside or inside themselves.

Openness measures how open an individual is to new experiences. It measures the degree to which an individual is intellectually curious and creative. The six sub-factors measured in the NEO-FFI are fantasy, aesthetics, feelings, actions, ideas, and values. Individuals with high measures of openness respond well to intellectual stimulation, may be motivated to seek out new experiences and engage in self-examination (McCrae, 2004). Mafouti et al. (2006) find that openness to experience is correlated with certain types of intelligence. High openness can manifest itself in the form of appreciation for art and adventure. Low openness indicates that an individual tends to avoid new experiences. These individuals prefer the traditional to the modern. They prefer things to stay as they are and are averse to doing things that disrupt the norm.

Agreeableness measures an individual's inclination to trust, altruism, and tender-mindedness. The six sub-factors measured in the NEO-FFI are trust, straightforwardness, altruism, compliance, modesty, and tender-mindedness. Individuals with

high levels of agreeableness tend to think of people as trustworthy, be more willing to help others, and be more humble. They tend to assume that people are good until proven otherwise. Individuals with low measures of agreeableness tend to be more suspicious of others and tend to err on the side of caution when dealing with others. They may even be antagonistic toward other individuals (Thompson, 2008).

Conscientiousness measures an individual's desire to do a task well. The six subfactors measured in the NEO-FFI are: competence, order, dutifulness, achievement striving, self-discipline, and deliberation. Thompson (2008) describes individuals with high levels of conscientiousness as being self-disciplined, efficient, careful, and thorough. They also tend to have a need for achievement through hard work and reliability. Individuals with low degrees of conscientiousness tend to be more laid back and less driven by success. They are not necessarily lazy, but have less of a need for achievement.

The NEO-FFI consists of sixty statements that measure each of the five personality traits. Subjects are asked to indicate whether each statement accurately describes them. They may respond in five possible ways: strongly disagree, disagree, neutral, agree, and strongly agree. The full survey instrument can be found in the appendix. To generate a score for each individual, responses receive a 0, 1, 2, 3, or 4 for the five choices from strongly disagree to strongly agree. Some responses are reverse coded in order to create a measure for each of the five factors. Higher scores for each factor correspond to being on the high end of the factor's spectrum. For example, individuals with high extraversion scores are more extraverted and individuals with low extraversion scores are more introverted. Each factor of the five factor model is independent and measures different aspects of an individual's personality. These factors are often broad measures that may offer little predictive power in specific situations. The psychology literature has produced a number of other personality

traits and assessments that may offer insight into individual differences in decision making under uncertainty.

2.4.2 Self-Monitoring

Snyder (1974) proposes a distinct personality trait of expressive control. He observes that individuals can and do monitor how they are perceived by others in social situations and argues that this heterogeneous trait is a vital component of personality theory. Individuals differ on how the perceive and interpret the actions of others in social situations. Some individuals may pay close attention to how they present themselves to other people and how other people view them. Snyder refers to this trait as self-monitoring. As with other personality traits, individuals are not simply high or low, but fall on some continuous distribution. Snyder (1974) provides a detailed description of self-monitoring and argues that it is, in essence, a measures of how individuals respond to nonverbal social cues. The goal of the self-monitoring assessment is to evaluate individuals on four aspects: how an individual (a) communicates accurately an emotional state, (b) communicates accurately an arbitrary emotional state, (c) conceals an inappropriate emotional state, and (d) conceals an appropriate emotional state. In the context of social settings, an individual may need to do any of these. For example, while attending a social gathering a person may have what could be perceived as an inappropriate emotional response. High self-monitors are able to recognize their own inappropriate responses and change their expression of the response. High self-monitors are very concerned with how they are perceived by others. They will adjust their behavior based on the behavior of those around them. For example, high self-monitors may change the topic of conversation from music to sports if they believe that the person(s) they are conversing with are more interested in sports than music. Low self-monitors would not change the subject, even if the

person(s) they are conversing with gives obvious nonverbal cues that they are not interest in music. Low self-monitors are either unable to analyze the social cues from others or are simply unconcerned.

The Snyder Self-Monitoring test includes eighteen instruments that ask subjects about their behavior. Specifically, the test presents subjects with a number of descriptions of social situations and asks them to mark whether each description accurately describes their behavior. The survey instrument can be found in the appendix. The responses are recorded as a simple binary true or false response. Every true response is associated with a self-monitoring behavior. The survey includes instruments for concern with social appropriateness, ability to control and modify self-presentation, use of social comparisons, and how expressing behavior changes between situations. To score the survey, each true response receives one point and each false response receives zero points. Simply summing all of the responses together generates a quantified measure of self-monitoring. Higher scores are associated with high degrees of self-monitors and lower scores are associates with low degrees of self-monitors.

2.4.3 Machiavellianism

Christie and Geis (1970) develop a personality measure based on Machiavelli's *The Prince* called the Mach-IV survey. They argue that the characteristics that came to be known as Machiavellian can accurately measure heterogeneity in individual personalities. As with other personality traits, individuals are not simply categorized as Machiavellian or not, they fall on a distribution from high to low. Individuals with a low degree of Machiavellian tendencies are referred to as *low machs* and individuals with high degrees of Machiavellian tendencies are referred to as *high machs*. Christie and Geis (1970) investigate correlations between behvaior and scores on their Machiavellian personality test.

They find that the primary difference between high and low machs is emotional detachment. High machs tend to be more willing to manipulate others, are less willing to be persuaded by others, and are more willing to do whatever it takes to win. They are markedly less likely to be emotionally involved with others than low machs. Low machs are more likely to take other people's emotions and outcomes into consideration when making decisions. They do not believe that the means always justify the ends, are more susceptible to persuasion, and may be easily deceived. It is important to note that Machiavellianism is not a measure of negative emotions. There is no evidence that high machs are more hostile, vicious, or vindictive than low machs. The Mach-IV simply measures how emotionally detached people are from others. High macsh may very well be able to empathize with others, but they are not willing to allow their empathy to prevent them from accomplishing their goals. Because high machs are concerned about accomplishing their goals at whatever costs, they may be more likely to defect in cooperation games and be easily induced to cheat. They may also be less inclined to adjust their strategy in games when experimenters introduce treatments.

The Mach-IV survey includes twenty statements designed to measure an individual's Machiavellian tendencies. Respondents have seven possible responses to each statement: strongly agree, somewhat agree, slightly agree, no opinion, slightly disagree, somewhat disagree, and strongly disagree. The survey instrument can be found in the appendix. Each of these responses is assigned a value of 1 to 7, respectively. A number of questions are reverse coded for higher values to always correspond with more Machiavellian responses. Per Gunnthorsdottier et al. (2002), a constant of 20 is added to each score to create a theoretical midpoint of 100 for simpler analysis. The maximum score of 160 is associated with an individual whose responses are strongly Machiavellian for each statement. The minimum score, 40, is associated with an individual whose responses are strongly anti-Machiavellian for each statement.

2.4.4 Locus of Control

Rotter (1954) develops the theory of locus of control which refers to the extent to which individuals believe they have control over events in their lives. As with the other personality traits, locus of control is not an indicator of type, but a continuum with internals at one end and externals at the other (Rotter, 1975). Individuals with an internal locus of control tend to attribute their life outcomes to their own abilities. They believe they have control over their life and their successes and/or failures are a result of their own actions. Individuals with an external locus of control tend to believe that fate plays a large role in their life outcomes. They attribute their successes and/or failures to external factors that are out of their control. Externals tend to be more stressed and prone to experience depression due to their perceived lack of control over their life (Benassi et al., 2007). Individuals who do not fall on the extremes are referred to as bi-locals, meaning they exhibit characteristics associated with both internal and external locus of control. Bi-locals are able to deal with stressful situations in a healthy manner and are less likely to experience depressive moods (Benassi et al., 2007).

We utilize an abbreviated version of the 23-item forced-choice Rotter Internal-External Locus of Control Scale (Rotter, 1966). The abbreviated version contains four-items that present subjects with a choice between two statements. One statement is associated with an internal locus of control and the other is associated with an external locus of control. The subject is asked to identify the statement closer to his/her opinion and then indicate whether the statement is much closer or slightly close to his/her opinion. Each item receives a score from 1 to 4: 1 if the subject indicates that the external statement is much closer to his/her opinion, 2 if the external statement is slightly closer, 3 is the internal statement is slightly closer, and 4 if the internal statement is much closer. Therefore, higher scores indicate individual who

tend to have an internal locus of control and low scores indicate individuals who tend toward an external locus of control. The full survey instrument can be found in the appendix.

2.4.5 Self-Esteem

Rosenberg (1965) develops a survey instrument to measures self-esteem. Self-esteem is an emotional evaluation of one's self-worth. It is both a judgement and attitude. Branden (1969) describes self-esteem as the sum of self-confidence and self-respect. As with the other personality traits, individuals have various degrees of self-esteem between high and low.

We utilize the widely used Rosenberg self-esteem scale (RSES) to measure subjects' self-esteem, which can be found in the appendix. The RSES has received much attention in the existing literature and is considered a reliable and valid tool for measuring self-esteem (Blascovich et al., 1991.) The scale consists of a ten-item survey that asks respondents to respond to each statement with: strongly disagree, disagree, agree, or strongly agree. Each response receives a score of 1-4. Some questions are backwards coded in order to derive a total score in which higher scores are associated with higher self-esteem.

2.5 Results and Discussion

2.5.1 Summary Statistics

Table 1 contains summary statistics for individuals in our sample including behavior in the game, risk preferences, personality traits, and demographic information. Roughly 42% of individuals in the sample chose to play Stag (the high risk, high payoff strategy) in the PFS game and 45% chose to play Stag in the PFP game.

About 29.5% of the sample chose to change their strategy (from stag to hare or from hare to stag) after the introduction of the silent partner. This result is similar to findings in the existing literature. Charness and Jackson (2009) find that about one third of their sample also chose to change their behavior between the PFS and PFP games. About 13.3% of our sample choose to change their behavior from the high risk strategy to the low risk strategy between the PFS and PFP games, referred to as a cautious shift, and 16.2% chose to switch from the low risk strategy to the high risk strategy, referred to as a risky shift. The mean risk preference score is 5.61, which indicates that the average individual in our sample is slightly risk averse. This finding is very similar to those in the literature (Holt and Laury, 2002).

The components of the big five personality inventory: neuroticism, extraversion, openness, agreeableness, and conscientiousness are all standardized to have a mean of 50 and a standard deviation of 10 in accordance with the existing literature. The average self-monitoring score is 9.429 on a scale of 20. This indicates that the average individual in our sample has roughly an equal number of high self-monitoring traits as low self-monitoring traits. The mean Machiavellianism score is 107.8 out of a possible 160. This is only slightly higher than the theoretical midpoint and indicates that the average individual in our sample demonstrates average Machiavellian tendencies. The average locus of control score is 12.2 out of 16. This indicates that the average person in our sample exhibits a slightly internal locus of control. Given the age of our sample, this is not surprising (Lachman, 1986). Our sample also exhibits a high degree of self-esteem on average with a mean score on the RSES of 34.04 out of 40.

The last section of Table 1 contains summary demographic statistics. Roughly 50% of the sample population is female, 63.8% are Caucasian, and 28.6% are African-American. The remaining 7.6% consisted of a number of other racial groups. The average age in our sample is 20.27 years old and age ranged from 18 to 43 years old.

The average ACT score, a measure of cognitive ability, is 23.13. How individuals in the sample react to the introduction of responsibility in the stag hunt has been studied in the previous literature (Charness and Jackson, 2009). However, little work has been done on uncovering why individuals change their behavior and why they become more risk averse or more risk loving. To begin to uncover the determinants of changes in risk taking behavior in the presence of responsibility, it is prudent to investigate differences between individuals based on their behavior in the PFS and PFP games.

2.5.2 Two Sample T-tests

Table 2 contains differences in means between individuals who play hare and those who play stag in the PFS game. The table also contains the corresponding two-sample t-test. There are no statistically significant differences among any of the personality traits between the two groups. Ex ante, we anticipated that personality traits would be different between those who play the risky strategy and those who do not. The only variable that is significantly different is the percentage of Caucasians who play hare verses the percentage who play stag. About 70% of hare players are Caucasian compared to 55% of stag players. The t-test indicates that this difference is significant at the 10% level. The percentage of African-Americans in the stag group is 13 percentage points higher than the percentage in the hare group. This result is not statistically significant at the 10% level, but is very close. Age, ACT scores, and order of play are not statistically significant between the two groups.

Table 3 contains differences in means between hare and stag players in the PFP game. Only one of the personality traits significantly differs between the two groups. Individuals who play hare in the PFP game score almost four points lower on the Agreeableness section of the NEO-FFI. These individuals are slightly more likely to

be trusting and altruistic. Individuals with higher agreeableness may believe that their opponent will want to maximize the payoff for all four players by playing stag. Individuals who are less trusting may be more inclined to play the low risk strategy to guarantee some payoff for themselves and their partner. The risk preference score is also significantly different between the two groups. Individuals who choose to play hare in the PFP game are more risk averse than those in the stag group. Risk aversion may be amplified by responsibility in that risk averse individuals may become even less likely to play a risky strategy under responsibility than they are playing for self. Whether the individual plays the PFS or PFP game first seems to be significantly different between the two groups. About 60% of those in the hare group play the PFS game first as opposed to 38% in the stag group. This may be an indication that order of play has an effect on whether an individual tends to be more or less risk averse when responsible for others. Individuals who begin by thinking about their own outcomes may play differently than those who begin thinking about their own outcomes and those of others. While it is useful to look at the difference in means between the two groups of players in each round, investigating differences between those who change behavior and those who do not may offer even more insight into the impact of individual difference on switching behavior.

Table 4 contains the differences in means between subjects who change their behavior between the two games and subjects who do not. There appear to be very few statistically significant differences between the average individuals in each group. Conscientiousness is the only personality trait that is statistically significant at the 10% level or better. Individuals who switch their behavior, regardless of direction, have, on average, a four point higher conscientiousness score. Individuals with higher levels of conscientiousness tend to be thorough, efficient, and careful. They are likely to think through a situation instead of acting impulsively are likely to evaluate the

costs and benefits of changing their behavior more than individuals who exhibit lower levels of conscientiousness. The dummy for playing the PFS game first is the only other statistically significant variable. Roughly 58% of individuals who did not change their behavior played the PFS game first, while only 32% of individuals who did change their behavior played the PFS treatment first. The majority of individuals who changed their behavior tend to be those who played the PFP game before playing for themselves. This may present a significant focusing effect previously unobserved in the literature. Individuals who think of others first may be more likely to adjust their risk taking strategies when they later think of themselves. To investigate this possibility further we split the sample based on order of play.

Table 5 contains the differences in means between individuals who play the PFP game first and those who play the PFS game first. There are significant differences between the behavior of individuals in the two groups. Roughly 56% of individuals who play the PFP game first play the high risk strategy in the PFP game compared to 34% of those who played the PFS game first. Those in the PFP first group are also much more likely to change their behavior between games. 40% of individuals in the PFP first group change their behavior between games compared to only 19% of those in the PFS first group. About the same percentage of individuals in each group chose to cautious shift. The differences between the percentage of each group who chose to risky shift is quite large and statistically significant; 27% of individuals in the PFP first group chose to play the high risk strategy in the PFP game and then switch to the low risk strategy in the PFS game. Only 5.6% of individuals in the PFS group chose to change their strategy to stag between the two games. There are several possibilities for why this is the case. First, the groups may be significantly different along non-cognitive and demographic traits which lead them to behave differently. The results in the rest of Table 5 offers some evidence for this. Individuals in the PFP first group

have slightly higher degrees of Machiavellian tendencies and higher self-monitoring scores. The percentage of female participants is much higher in the PFP first group, 58%, compared to the PFS first group, 42%. Alternatively, the observed differences may have little to do with individual heterogeneity and instead be solely dependent on which order the games are presented to participants. To investigate the impact of the personality traits, demographic variables, and order of play on behavior, we estimate a discrete choice model.

2.5.3 Regression Results

Table 6 contains the marginal effects from a multinomial logit model with the possible strategy choices as the dependent variable and the personality traits, risk preferences, demographics, and order of play as independent variables.[2] The results are interpreted as the marginal change in the probabilities of an average individual playing one of the four strategy pairings: stag-stag, stag-hare, hare-hare, and hare-stag. The first strategy in the pairing is the one played in the PFS game and the second is the one played in the PFP game. The marginal effect of neuroticism is the only statistically significant personality trait. A one point increase in neuroticism is associated with a 0.02 percentage point increase in the probability of an individual playing the high risk strategy in both games. Alternatively, a one point increase in neuroticism is also associated with a 0.016 percentage point decrease in the probability of playing the low risk payoff for both games. The marginal effects of neuroticism on switching behavior are not statistically significant. Individuals with higher neuroticism scores tend to be emotionally unstable and prone to feelings of anxiety and guilt. They often do not respond well to changes in the environment and also tend to

[2]We also estimated separate models for each personality trait measure to alleviate possible multicollinearity issues. The estimated marginal effects were very similar to those from the full model and can be found in Tables 7 and 8.

have trouble delaying satisfaction. Holding all else equal, this could explain why high neurotics are more likely to play the high risk strategy regardless of whether they are playing for themselves or for others as well. If an individual is less inclined to delay satisfaction and more inclined to want more now, then they may be willing to make riskier decision regardless of other factors. Also, since they respond poorly to environmental changes, they may simply not respond to the change from the PFS to the PFP game. While the previous results led us to believe that heterogeneity along personality traits between individuals should have an impact on the probability of changing behavior, the regression results offer little evidence that personality has a significant impact on risk taking behavior in the stag hunt.

Previously, we hypothesized that the observed differences in strategic choices between those who play the PFP game first and those who play the PFS game first may be a result of personality heterogeneity between the groups. Specifically, differences in Machiavellian tendencies and self-monitoring. However, this does not seem to be the case. The marginal effects for both personality traits are small and statistically insignificant. This result is not entirely surprising. Many personality trait instruments are created to capture very broad underlying differences between individuals. It may be the case that these measures do a poor job of predicting behavior in very narrow, specific situations. Perhaps an experimental design that allows for multiple observations over a long period of time would reveal higher correlations between personality traits and behavior in games. Even though the personality traits do not seem to have a significant impact, several of the other variables do.

Table 6 also contains estimated marginal effects for a number of other variables. The marginal effects of the Holt-Laury risk score are relatively large and statistically significant. A one point increase in the risk score is associated with a decrease in the probability of playing the high risk strategy in both games by 0.11 percentage

points, an increase in the probability of playing the low risk strategy in both games by 0.07 percentage points, and an increase in the probability of cautious shifting by 0.04 percentage points. This result is straightforward and intuitive. More risk averse individuals are less likely to play the high risk strategy in both games and more likely to play the low risk strategy in both games. The most interesting result is that more risk averse individuals are also more likely to cautious shift between games. More risk averse individuals may become even more risk averse when they are responsible for another person's outcome. Since personality traits are meant to measure broad differences in personality, observed risk preferences may be better at predicting risky behavior in a one-shot game such as the stag hunt. While risk plays an important role in determining strategic behavior, demographic differences may also influence observed behavior.

Age also has a statistically significant impact on behavior between games. Older individuals are more likely to play the high risk strategy for both games, but less likely to risky shift. A one year increase in age is associated with a 0.06 percentage point increase in the probability of playing stag-stag and a 0.04 percentage point decrease in the probability of risky shifting. Established findings in the literature indicate that older individuals tend to be more risk averse than younger individuals (Gardner and Steinberg, 2005). The finding for high risk players may seem counter to this, but it is important to note the lack of variation in the age of our sample. The average age is 20 with a standard deviation of only 3.8. Since the age of our sample is heavily skewed left, this result may be due to relatively small sample size. The marginal effects of all other demographic variables are statistically insignificant.

Order of play has a large impact on switching behavior, specifically on risky shifting. Individuals who played the PFS game first are 0.13 percentage points less likely to risky shift. This may represent an important framing effect in these types of games.

An individual who is first presented with the PFP game is much more likely to switch from playing the high risk strategy when responsible for another to playing the low risk strategy when responsible only for herself. It may be the case that individuals are exhibiting some sort of learning effect since they are playing the game a second time. The results in Table 5 offers some evidence for this hypothesis. Individuals who play the PFP game first tend to play the high risk strategy more in their first game, 55%, and less in their second game, 42%. This is similar to how individuals in the PFS first group behave. In their first game, 41% of individuals in the PFS first group play the high risk strategy. In their second game, the PFP game, 34% play the high risk strategy. Regardless of order of play, individuals are more likely to play the low risk strategy in their second round. The changes in observed behavior may also be an example of a cognitive bias called a focusing effect. Individuals who are presented with the PFS game first may focus in on the responsibility aspect of the PFP game since it is the only change between the games. This may not be the case for individuals who play the PFP game first. Since they begin playing a game in which they are responsible for another party, they may not focus on that aspect of the game. It may be the case that individuals in the PFS first group are less likely to risky shift due to focusing in on the responsibility they now hold while individuals in the PFP first group are more likely to play the high risk strategy because they are not focusing on their role as a responsible decision maker. The results offer some support for this since individuals who play the PFS game first are much less likely to risky shift. However, if individuals are changing their behavior entirely based on on a focussing effect, we would also expect individuals in the PFS first group to be more likely to cautious shift. This is not the case. The marginal effect of playing the PFS game first on cautious shifting is -0.0076, a very small change, and statistically insignificant. A combination of the learning and focussing effect are likely responsible for a portion of

the observed behavior changes. However, given the current experimental design, it is not possible to empirically determine how these two effects interact to affect behavior between the two rounds.

2.6 Conclusion

Few decisions in the market, whether it is to purchase a good, invest in a business, or to take a new job, are made with full information. Many studies empirically and experimentally investigate the impact of uncertainty on risk taking behavior. However, few focus on the role of responsibility in the decision making process. The decision maker is often not the only person to be affected by his/her decision. Many decisions directly affect others who have no power in the decision making process. For example, parents make many choices that impact their children without the input of the child, managers may make a decision that affects employees without their input, and often brokers or money managers make investment decisions without the explicit consent of their customers.

Several studies investigate strategic risk taking behavior in the presence of responsibility and find that subjects' risk taking choices change when they are responsible for others' outcomes (Charness and Jackson, 2009; Reynolds et al., 2011). While these studies uncover differences in behavior, they offer little evidence to explain their observations. We attempt to add to the insight of previous research by investigating the determinants of behavior; specifically, the impact of personality.

We utilize an A-B experimental design in which subjects play a variation on the classic stag hunt game. The stag hunt involves participants choosing between two strategies: hunting stag or hunting hare. Payoffs are determined by the subject's decision and the decision of an anonymous, randomly assigned opponent. Playing hare guarantees a low payoff regardless of the opponent's choice, but playing stag

offers a higher payoff if the opponent also plays stag and a lower payoff otherwise. As in Charness and Jackson (2009), subjects play two rounds of the stag hunt. In the first round, a participant's outcome is directly related to his/her decision and the decision of their opponent. In the second round, participants are told that their decision now determines their outcome and the outcome of a silent teammate. Participants complete a risk preference lottery and a series of personality trait assessments to capture a thorough picture of each subject's personality. 120 undergraduates were recruited to participate in five experimental sessions involving cash payoffs.

We find that around one-third of our sample behaves differently under responsibility than when they play only for themselves which is similar to previous findings in the literature (Charness and Jackson, 2009). Ex ante, we hypothesize that personality heterogeneity should significantly explain differences in observed behavior. However, the results offer minimal support for this hypothesis. Our results indicate that observed risk preferences, measured using a Holt-Laury risk lottery, are significant predictors of behavior in the stag hunt responsibility game. Risk averse individuals are likely to play the low risk strategy (hare) in both the play for self and responsibility game. They are also much more likely to shift their strategy from the high risk (stag) strategy in the play for self game to the low risk (hare) strategy in the responsibility game. We also find evidence that the order of play impacts changes in behavior between the two games. Half of our sample played the play for self game first and the other half played the responsibility game first. We find that individuals who play for self first are significantly less likely to shift from the low risk to the high risk strategy after responsibility is introduced. We argue that learning effects and cognitive biases, in the form of focusing/anchoring effects, may be driving these results. However, the current experimental design does not allow us to empirically investigate the impact of each in isolation.

REFERENCES

[1] Ben-Ner, A., Putterman, L., Kong, F., and Magan, D. Reciprocity in a two-part dictator dame. *Journal of Economic Behavior & Organization 53*, 3 (2004), 333–352.

[2] Benassi, V. A., Sweeney, P. D., and Dufour, C. L. Is there a relation between locus of control orientation and depression? *Journal of Abnormal Psychology 97*, 3 (1988), 357.

[3] Biais, B., Hilton, D., Mazurier, K., and Pouget, S. Judgemental overconfidence, self-monitoring, and trading performance in an experimental financial market. *Review of Economic Studies 72*, 2 (2005), 287–312.

[4] Blascovich, J., Tomaka, J., et al. Measures of self-esteem. *Measures of Personality and Social Psychological Attitudes 1* (1991), 115–160.

[5] Boone, C., De Brabander, B., and Van Witteloostuijn, A. The impact of personality on behavior in five prisoner's dilemma game. *Journal of Economic Psychology 20*, 3 (1999), 343–377.

[6] Branden, N. *The psychology of self-esteem: A new concept of man's psychological nature*. Bantam Books, 1971.

[7] Chakravarty, S., Harrison, G. W., Haruvy, E. E., and Rutström, E. E. Are you risk averse over other people's money? *Southern Economic Journal 77*, 4 (2011), 901–913.

[8] Charness, G. Responsibility and effort in an experimental labor market. *Journal of Economic Behavior & Organization 42*, 3 (2000), 375–384.

[9] Charness, G., and Dufwenberg, M. Promises and partnership. *Econometrica 74*, 6 (2006), 1579–1601.

[10] Charness, G., and Jackson, M. The role of responsibility in strategic risk-taking. *Journal of Economic Behavior & Organization 69*, 3 (2009), 241–247.

[11] Christie, R., Geis, F. L., and Berger, D. *Studies in Machiavellianism*. Academic Press New York, 1970.

[12] Costa, P. T., and McCrae, R. R. *The NEO Personality Inventory: Manual, form S and form R*. Psychological Assessment Resources, 1985.

[13] DellaVigna, S. Psychology and economics: Evidence from the field. *Journal of Economic Literature* (2009), 315–372.

[14] Gardner, M., Steinberg, L., et al. Peer influence on risk taking, risk preference, and risky decision making in adolescence and adulthood: An experimental study. *Developmental Psychology 41*, 4 (2005), 625–634.

[15] Goldberg, L. R. The development of markers for the big-five factor structure. *Psychological Assessment 4*, 1 (1992), 26–42.

[16] Gunnthorsdottir, A., McCabe, K., and Smith, V. Using the machiavellianism instrument to predict trustworthiness in a bargaining game. *Journal of Economic Psychology 23*, 1 (2002), 49–66.

[17] Harrison, G., Johnson, E., McInnes, M., and Rutström, E. Risk aversion and incentive effects: Comment. *American Economic Review* (2005), 897–901.

[18] Holt, C., and Laury, S. Risk aversion and incentive effects. *American Economic Review 92*, 5 (2002), 1644–1655.

[19] Kerr, N., and MacCoun, R. Role expectations in social dilemmas: Sex roles and task motivation in groups. *Journal of Personality and Social Psychology 49*, 6 (1985), 1547.

[20] Lachman, M. E. Locus of control in aging research: a case for multidimensional and domain-specific assessment. *Psychology and Aging 1*, 1 (1986), 34.

[21] McCrae, R. R., and Costa, P. T. A contemplated revision of the neo five-factor inventory. *Personality and Individual Differences 36*, 3 (2004), 587–596.

[22] McCrae, R. R., and Costa, P. T. A contemplated revision of the neo five-factor inventory. *Personality and Individual Differences 36*, 3 (2004), 587–596.

[23] McRae, R. R. Openness to experience. *Encylopedia of Applied Psychology* (2004).

[24] Moutafi, J., Furnham, A., and Crump, J. What facets of openness and conscientiousness predict fluid intelligence score? *Learning and Individual Differences 16*, 1 (2006), 31–42.

[25] Pahlke, J., Strasser, S., and Vieider, F. Responsibility effects in decision making under risk. *Working Paper* (2010).

[26] Reynolds, D., Joseph, J., and Sherwood, R. Risky shift versus cautious shift: Determining differences in risk taking between private and public management decision making. *Journal of Business & Economics Research 7*, 1 (2011).

[27] Rosenberg, M. *Society and the Adolescent Self-Image*. Princeton University Press Princeton, NJ, 1965.

[28] Rotter, J. *Social Learning and Clinical Psychology*. Englewood Cliffs, NJ: Prentice-Hall, 1954.

[29] Rotter, J. B. Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs: General and Applied 80*, 1 (1966), 1–28.

[30] Rotter, J. B. Some problems and misconceptions related to the construct of internal versus external control of reinforcement. *Journal of Consulting and Clinical Psychology 43*, 1 (1975), 56.

[31] Rousseau, J. J. A discourse on inequality.

[32] Schmitt, P., Shupp, R., Swope, K., and Mayer, J. Pre-commitment and personality: Behavioral explanations in ultimatum games. *Journal of Economic Behavior & Organization 66*, 3 (2008), 597–605.

[33] Skyrms, B. *The stag hunt and the evolution of social structure*. Cambridge University Press, 2003.

[34] Snyder, M. Self-monitoring of expressive behavior. *Journal of Personality and Social Psychology 30*, 4 (1974), 526–537.

[35] Stoner, J. A. F. *A comparison of individual and group decisions involving risk*. PhD thesis, Massachusetts Institute of Technology, 1961.

[36] Thompson, E. R. Development and validation of an international english big-five mini-markers. *Personality and Individual Differences 45*, 6 (2008), 542–548.

[37] Wallach, M., Kogan, N., and Bem, D. Group influence on individual risk taking. *The Journal of Abnormal and Social Psychology 65*, 2 (1962), 75.

TABLES

Table 1: Summary Statistics

Variable	Mean	Std. Dev.	Min.	Max.
Subject Behavior				
Play Stag in PFS	0.419	0.496	0.000	1.000
Play Stag in PFP	0.448	0.500	0.000	1.000
Change Strategy	0.295	0.458	0.000	1.000
Cautious Shift	0.133	0.342	0.000	1.000
Risky Shift	0.162	0.370	0.000	1.000
Risk Preference				
HL Risk Score	5.610	1.832	2.000	10.000
Personality Traits				
Neuroticism	50.000	10.000	32.653	77.848
Extraversion	50.000	10.000	22.094	68.169
Openness	50.000	10.000	25.554	72.745
Agreeableness	50.000	10.000	11.948	69.304
Conscientiousness	50.000	10.000	19.196	69.314
Self-Monitoring Score	9.429	3.470	2.000	17.000
Machiavellianism	107.808	16.187	59.000	134.000
Locus of Control	12.181	2.170	4.000	16.000
Self-Esteem	34.038	4.485	19.000	40.000
Other Controls				
Female	0.495	0.502	0.000	1.000
Caucasian	0.638	0.483	0.000	1.000
African-American	0.286	0.454	0.000	1.000
Age	20.276	3.849	18.000	43.000
ACT Score	23.133	3.719	16.000	35.000
Play PFS First	0.505	0.502	0.000	1.000

Notes: $N = 105$. NEO-FFI measures have been standardized to have a mean of 50 and standard deviation of 10. Sample size is 105 instead of 120 because of missing ACT scores.

Table 2: Difference in Means by Play in PFS

Variable	Hare in PFS	Stag in PFS	Diff.
Change Strategy	0.2787	0.3182	-0.0395
			[-0.4339]
Neuroticism	49.5457	50.6299	-1.0842
			[-0.5463]
Extraversion	51.0233	48.5813	2.4420
			[1.2378]
Openness	49.5364	50.6427	-1.1063
			[-0.5575]
Agreeableness	50.2136	49.7039	0.5096
			[0.2565]
Conscientiousness	49.6583	50.4738	-0.8155
			[-0.4107]
Self-Monitoring Score	9.2590	9.6636	-0.4046
			[-0.5878]
Machiavellianism	107.9667	107.5909	0.3758
			[0.1164]
Locus of Control	12.1967	12.1591	0.0376
			[0.0873]
Self-Esteem	33.8197	34.3409	-0.5212
			[-0.5857]
HL Risk Score	5.7705	5.3864	0.3841
			[1.0608]
Female	0.5246	0.4545	0.0700
			[0.7032]
Caucasian	0.7049	0.5455	0.1595*
			[1.6844]
African-American	0.2295	0.3636	-0.1341
			[-1.5030]
Age	19.8197	20.9091	-1.0894
			[-1.4382]
ACT Score	23.4918	22.6364	0.8554
			[1.1651]
Play PFS First	0.5082	0.5000	0.0082
			[0.0821]

Notes: $N = 105$. T-stats in brackets. Legend: *denotes significant at the 10% level, **denotes significant at the 5% level, and ***denotes significant at the 1% level

Table 3: Difference in Means by Play in PFP

Variable	Hare in PFP	Stag in PFP	Diff.
Change Strategy	0.2414	0.3617	-0.1203
			[-1.3428]
Neuroticism	48.9055	51.3507	-2.4452
			[-1.2492]
Extraversion	49.5489	50.5567	-1.0078
			[-0.5117]
Openness	49.3530	50.7984	-1.4455
			[-0.7349]
Agreeableness	48.3271	52.0644	-3.7372*
			[-1.9290]
Conscientiousness	48.6883	51.6187	-2.9304
			[-1.5021]
Self-Monitoring Score	9.1931	9.7191	-0.5260
			[-0.7710]
Machiavellianism	106.3509	109.5745	-3.2236
			[-1.0109]
Locus of Control	12.0345	12.3617	-0.3272
			[-0.7669]
Self-Esteem	33.7586	34.3830	-0.6244
			[-0.7076]
HL Risk Score	6.0517	5.0638	0.9879***
			[2.8396]
Female	0.4655	0.5319	-0.0664
			[-0.6717]
Caucasian	0.6897	0.5745	0.1152
			[1.2183]
African-American	0.2414	0.3404	-0.0990
			[-1.1131]
Age	20.1034	20.4894	-0.3859
			[-0.5090]
ACT Score	23.5517	22.6170	0.9347
			[1.2847]
Play PFS First	0.6034	0.3830	0.2205**
			[2.2808]

Notes: $N = 105$. T-stats in brackets. Legend: *denotes significant at the 10% level, **denotes significant at the 5% level, and ***denotes significant at the 1% level

Table 4: Difference in Means for Switchers

Variable	Did not Switch	Switched	Diff.
Neuroticism	50.6709	48.3985	2.2725
			[1.0628]
Extraversion	49.1616	52.0014	-2.8398
			[-1.3323]
Openness	49.7185	50.6719	-0.9533
			[-0.4439]
Agreeableness	49.0534	52.2595	-3.2061
			[-1.5077]
Conscientiousness	48.8281	52.7975	-3.9695*
			[-1.8778]
Self-Monitoring Score	9.2216	9.9226	-0.7010
			[-0.9438]
Machiavellianism	107.5342	108.4516	-0.9174
			[-0.2632]
Locus of Control	12.1216	12.3226	-0.2010
			[-0.4312]
Self-Esteem	33.6081	35.0645	-1.4564
			[-1.5276]
HL Risk Score	5.5135	5.8387	-0.3252
			[-0.8285]
Female	0.4730	0.5484	-0.0754
			[-0.6999]
Caucasian	0.6486	0.6129	0.0357
			[0.3446]
African-American	0.2703	0.3226	-0.0523
			[-0.5368]
Age	20.6486	19.3871	1.2616
			[1.5420]
ACT Score	23.3243	22.6774	0.6469
			[0.8118]
Play PFS First	0.5811	0.3226	0.2585**
			[2.4630]

Notes: $N = 105$. T-stats in brackets. Legend: *denotes significant at the 10% level, **denotes significant at the 5% level, and ***denotes significant at the 1% level

Table 5: Difference in Means by Order of Play

Variable	PFP First	PFS First	Diff.
Play Stag in PFS	0.4231	0.4151	0.0080
			[0.0821]
Play Stag in PFP	0.5577	0.3396	0.2181**
			[2.2808]
Change Strategy	0.4038	0.1887	0.2152**
			[2.4630]
Cautious Shift	0.1346	0.1321	0.0025
			[0.0379]
Risky Shift	0.2692	0.0566	0.2126***
			[3.0591]
Neuroticism	48.4602	51.5108	-3.0506
			[-1.5739]
Extraversion	51.7475	48.2854	3.4621*
			[1.7925]
Openness	50.4825	49.5266	0.9559
			[0.4879]
Agreeableness	51.5829	48.4470	3.1358
			[1.6190]
Conscientiousness	51.3097	48.7150	2.5948
			[1.3343]
Machiavellianism	110.8654	104.7500	6.1154*
			[1.9525]
Locus of Control	12.1923	12.1698	0.0225
			[0.0529]
Self-Esteem	34.2885	33.7925	0.4960
			[0.5648]
Self-Monitoring Score	10.0192	8.8491	1.1702*
			[1.7448]
$N =$	53	52	

Notes: $N = 105$. T-stats in brackets. Legend: *denotes significant at the 10% level, **denotes significant at the 5% level, and ***denotes significant at the 1% level

Table 5 continued: Difference in Means by Order of Play

Variable	PFP First	PFS First	Diff.
HL Risk Score	5.5000	5.7170	-0.2170
			[-0.6050]
Female	0.5769	0.4151	0.1618*
			[1.6643]
Caucasian	0.6731	0.6038	0.0693
			[0.7337]
African-American	0.2308	0.3396	-0.1089
			[-1.2316]
Age	19.8654	20.6792	-0.8139
			[-1.0841]
ACT Score	23.2308	23.0377	0.1930
			[0.2648]
$N =$	53	52	

Notes: $N = 105$. T-stats in brackets. Legend: *denotes significant at the 10% level, **denotes significant at the 5% level, and ***denotes significant at the 1% level

Table 6: Marginal Effects from Strategy Pairings Multinomial Logit

Variable	Pr(SS)	Pr(SH)	Pr(HH)	Pr(HS)
Neuroticism	0.0194**	-0.0079	-0.0161*	0.0046
	(0.0093)	(0.0052)	(0.0091)	(0.0031)
Extraversion	-0.0035	-0.0046	0.0067	0.0014
	(0.0088)	(0.0051)	(0.0096)	(0.0026)
Openness	-0.0016	0.0019	-0.0025	0.0022
	(0.0069)	(0.0042)	(0.0067)	(0.0021)
Agreeableness	0.0096	0.0001	-0.0136	0.0040
	(0.0077)	(0.0045)	(0.0086)	(0.0036)
Conscientiousness	0.0013	0.0023	-0.0064	0.0027
	(0.0068)	(0.0041)	(0.0074)	(0.0027)
Locus of Control	-0.0051	-0.0036	0.0001	0.0087
	(0.0433)	(0.0177)	(0.0355)	(0.0116)
Self-Esteem	0.0227	0.0001	-0.0296	0.0068
	(0.0242)	(0.0130)	(0.0246)	(0.0076)
Self-Monitoring Score	0.0236	0.0078	-0.0325	0.0012
	(0.0210)	(0.0122)	(0.0243)	(0.0107)
Machiavellianism	-0.0020	-0.0002	0.0032	-0.0010
	(0.0049)	(0.0033)	(0.0054)	(0.0017)
HL Risk Score	-0.1106***	0.0419**	0.0725**	-0.0038
	(0.0400)	(0.0203)	(0.0367)	(0.0108)
Age	0.0627***	0.0052	-0.0231	-0.0449**
	(0.0167)	(0.0139)	(0.0220)	(0.0186)
Female	0.1172	-0.0186	-0.1213	0.0227
	(0.1305)	(0.0875)	(0.1375)	(0.0555)
African-American	-0.0174	0.0850	-0.0196	-0.0480
	(0.2132)	(0.2571)	(0.2479)	(0.0602)
Caucasian	-0.2744	0.0518	0.2779	-0.0553
	(0.2247)	(0.1835)	(0.2070)	(0.0980)
ACT Score	0.0062	-0.0010	-0.0005	-0.0047
	(0.0170)	(0.0118)	(0.0197)	(0.0075)
Play PFS First	-0.0705	-0.0076	0.2075	-0.1294*
	(0.1288)	(0.0781)	(0.1340)	(0.0696)

Notes: $N = 105$. Pr(SS)=probability of playing Stag-Stag, Pr(SH)=probability of playing Stag-Hare, etc. Standard Errors in parentheses. Legend: *denotes significant at the 10% level, **denotes significant at the 5% level, and ***denotes significant at the 1% level

Table 7: Marginal Effects from Separate Estimations Including Risk Preferences

Variable	Pr(SS)	Pr(SH)	Pr(HH)	Pr(HS)
Neuroticism	0.0113*	-0.0071	-0.0132*	0.0026
	(0.0064)	(0.0044)	(0.0061)	(0.0016)
Extraversion	0.0004	-0.0031	0.0009	0.0019
	(0.0070)	(0.0043)	(0.0072)	(0.0016)
Openness	0.0022	0.0019	-0.0063	0.0022
	(0.0064)	(0.0035)	(0.0062)	(0.0017)
Agreeableness	0.0049	-0.0010	-0.0062	0.0023
	(0.0056)	(0.0035)	(0.0062)	(0.0024)
Conscientiousness	0.0014	0.0015	-0.0061	0.0032
	(0.0066)	(0.0031)	(0.0068)	(0.0021)
Locus of Control	-0.0096	0.0002	-0.0019	0.0113
	(0.0333)	(0.0164)	(0.0289)	(0.0095)
Self-Esteem	-0.0010	0.0079	-0.0113	0.0045
	(0.0125)	(0.0124)	(0.0135)	(0.0048)
Self-Monitoring Score	0.0141	0.0046	-0.0229	0.0041
	(0.0150)	(0.0093)	(0.0180)	(0.0077)
Machiavellianism	-0.0001	-0.0009	0.0005	0.0005
	(0.0028)	(0.0024)	(0.0038)	(0.0019)

Notes: $N = 105$. Each variable's marginal effect is estimated in separate estimations. Pr(SS)=probability of playing Stag-Stag, Pr(SH)=probability of playing Stag-Hare, etc. Standard Errors in parentheses. Legend: *denotes significant at the 10% level, **denotes significant at the 5% level, and ***denotes significant at the 1% level

Table 8: Marginal Effects from Separate Estimations Excluding Risk Preferences

Variable	Pr(SS)	Pr(SH)	Pr(HH)	Pr(HS)
Neuroticism	0.0100*	-0.0059	-0.0098*	0.0021
	(0.0049)	(0.0042)	(0.0044)	(0.0014)
Extraversion	-0.0006	-0.0029	0.0018	0.0017
	(0.0062)	(0.0040)	(0.0067)	(0.0015)
Openness	0.0014	0.0023	-0.0058	0.0021
	(0.0058)	(0.0035)	(0.0060)	(0.0016)
Agreeableness	0.0049	-0.0010	-0.0062	0.0023
	(0.0055)	(0.0012)	(0.0063)	(0.0023)
Conscientiousness	0.0015	0.0019	-0.0064	0.0030
	(0.0058)	(0.0033)	(0.0063)	(0.0020)
Locus of Control	-0.0021	-0.0041	-0.0043	0.0105
	(0.0263)	(0.0174)	(0.0253)	(0.0087)
Self-Esteem	-0.0026	0.0083	-0.0096	0.0040
	(0.0120)	(0.0116)	(0.0130)	(0.0045)
Self-Monitoring Score	0.0133	0.0050	-0.0217	0.0034
	(0.0150)	(0.0096)	(0.0174)	(0.0071)
Machiavellianism	0.0006	-0.0013	0.0001	0.0005
	(0.0028)	(0.0022)	(0.0037)	(0.0017)

Notes: $N = 105$. Each variable's marginal effect is estimated in separate estimations. Pr(SS)=probability of playing Stag-Stag, Pr(SH)=probability of playing Stag-Hare, etc. Standard Errors in parentheses. Legend: *denotes significant at the 10% level, **denotes significant at the 5% level, and ***denotes significant at the 1% level

CHAPTER III

Personality, Altruism, and Reciprocity

3.1 Introduction

Many studies, using experimental techniques, find that subjects often behave counter to many of the main assumptions made regarding human behavior in economics. For example, bargaining games are used extensively to study altruistic behavior and reciprocity. Behavior in the dictator game reveals that individuals are often willing to give away a portion of their income for no monetary gain in the future and without any threat of negative reciprocity. This is counter to own-wealth maximizing principles. Results from the ultimatum game, another popular bargaining game, often indicate that individuals both respond to the threat of reciprocity and often engage in negative reciprocity if they believe another player acts inequitably. Psychology plays a role in every decision a person makes, including behavior in these two games. Recent studies begin to introduce personality psychology into the analysis of bargaining behavior with mixed results. The current study contributes to this growing literature by incorporating a larger battery of personality traits into our analysis of bargaining behavior. We find important correlations between certain personality traits and bargaining behavior that have not been previously studied.

We conduct a series of experiments on 120 students at Middle Tennessee State University. Half of the subjects play the first mover role in a $10 dictator and ultimatum game. The other half plays the role of second mover in both games. Player assign-

ment is anonymous and random. We utilize the strategy method in order to capture complete strategy profiles for second movers. Subjects complete a battery of personality trait assessments for the big five personality model, Snyder self-monitoring, Machiavellian tendencies, locus of control, and self-esteem. They also complete a revealed risk preference lottery in order to independently measure risk preferences. We estimate several regression models on behavior in the games to uncover the impact of personality traits on altruism and reciprocity.

As with previous studies, we find evidence that certain personality traits partially explain behavior in the dictator and ultimatum games. We find that openness and conscientiousness, components of the big five personality model, are positively correlated with altruistic behavior in the dictator game. We also find that internal locus of control, a previously unstudied personality trait, is negatively correlated with altruistic behavior. We argue that individuals who exhibit an internal locus of control, holding all else constant, may not feel obligated by social pressures or moral obligations to be altruistic since they perceive themselves as being entirely in control of the situation.

In the ultimatum game, we find that extraversion and risk preferences play an important role in determining proposals by first movers. Previous studies find that extraverts tend to play self-interested strategies when bargaining over monetary payoffs in dictator games (Ben-Ner, Kramer, and Levy, 2008). Our findings confirm this for bargaining decisions in the ultimatum game; extraverts tend to offer less to second movers. We also find that more risk averse first movers tend to offer lower proposals, which may be a result of perceived risk in the role of the proposer. Personality traits also appear to play an important role in determining behavior for second movers in the ultimatum game. High extraversion scores are associated with negative reciprocity. Extraverts are more likely to punish inequitable first movers by rejecting low propos-

als. This also confirms previous findings in the literature. Unlike previous studies, we find that self-monitoring and Machiavellianism are also significant predictors of second mover behavior. High self-monitors and individuals with more Machiavellian tendencies are more likely to accept low offers, holding all else constant. We conclude that using a more complete battery of personality traits allows for a more accurate picture of the relationship between personality, altruism, and reciprocity.

3.2 Previous Research

Bargaining games receive much attention in the experimental economics literature.[1] One of the earliest findings in the literature is that individuals do not tend to behave as utility maximizing principles suggests; they tend to be altruistic even if there is no reciprocal benefit to their altruistic behavior. This indicates that individuals' utility functions are not simply made up of their own wealth. The theory of other-regarding preferences attempts to address why individuals exhibit behaviors counter to traditional utility maximizing assumptions. Fehr and Schmidt (1999) argue that some individuals have an inherent aversion to inequity and are willing to dispose of some of their own income in order to achieve equity among players. Players regard others in their preference and utility functions. Berg, Dickhaut, and McCabe (1995) argue that potential future reciprocity plays an important role in determining the extent to which individuals care about others' outcomes. It is not that people are purely altruistic, but they know inequitable contributions may lead to negative reciprocity in the future. Andreoni (1989) offers a more psychologically intensive explanation. He argues that some people receive utility in the act of giving itself without any threat of future reciprocity. He refers to this as *warm glow giving.* These individuals are not

[1]Roth (1995) provides a thorough overview of the history of the dictator and ultimatum games and their importance in experimental economics.

necessarily interested in the positive outcomes of others, but simply receive enjoyment from giving. Using neuroimaging , Harbaugh et al. (2007) provide some physiological evidence for the warm glow hypothesis. They find that reward-related areas of the brain are stimulated when first movers in dictator games behave altruistically.

Ultimatum games introduce the possibility of reciprocity in bargaining. Second movers can now accept or reject the allocation proposed by first movers. Rejection results in both players receiving a payoff of \$0. Güth, Schmittberger, and Schwarze (1982) conduct one of the first ultimatum bargaining experiments in the literature. They find that most first movers rely on a fairness or equity heuristic when deciding how much to offer in their proposal. Many other studies in the literature uncover similar results (Roth, 1995). As with the dictator game, subject behavior is often counter to conventional utility maximizing principles. Second movers should accept any offer greater than \$0 since something is better than nothing. However, results typically indicate that offers of less than 20% of the initial budget are only accepted 50% of the time (Thaler, 1988). Individuals appear to be sensitive to perceived fairness even to the point of choosing to receive nothing in response to an unfair offer. While many economists have offered theories to explain this behavior, mainly in the form of other-regarding preferences, few have incorporated tools from psychology in their analysis.

Several recent studies incorporate personality psychology into their analysis of behavior in bargaining games. Ben-Ner et al. (2004b) investigate the impact of reciprocity in a two part dictator game in which subjects change roles from dictator to receiver. The most relevant finding that relates to the current study is that three components of the big five model of personality, neuroticism, openness, and agreeableness, are associated with positive reciprocity. Individuals with higher measures of these three reward their partners when they felt that they were treated well. Ben-Ner

et al. (2004a) investigate differences in giving in the dictator game between males and females. They find that observed difference in the giving behavior of men and women can be explained with personality heterogeneity using the big five factor of personality. Swope et al. (2008) extend the findings of Ben-Ner et al. (2004a) to ultimatum, trust, and prisoner dilemma games. They utilize the popular Myers-Brigg Type Indicator and find that when they control for personality behavioral differences between men and women disappear. They find only limited support for the importance of personality in explaining subject behavior in their sample. Ben-Ner, Kramer, and Levy (2008) find that extraversion and agreeableness explain differences in subject behavior between a dictator game using hypothetical payoffs and a dictator game with real money payoffs. They argue that extraverts exhibit altruistic behavior when bargaining over hypothetical payoffs, but switch to self-interested strategies when bargaining over real monetary payoffs. They also find that individuals with high agreeableness behave in the opposite fashion by giving small offers when faced with hypothetical payoffs and giving altruistic offers when faced with monetary payoffs. Becker et al. (2012) conduct an extensive study of personality traits and revealed preferences including altruism and reciprocity. They are the only existing study to investigate the impact of locus of control and bargaining. They also utilize the big five model. They find that internal locus of control is correlated with negative reciprocity, meaning that individuals who believe they have control over their life outcomes tend to punish their opponents for perceived unfair behavior. They also find that extraversion is correlated with negative reciprocity. Finally, they find that openness is positively correlated with altruism and extraversion is negatively correlated with altruism. They do not continue their analysis to include regression analysis but simply report correlations between behavior and each personality trait independent of controls.

Unlike previous studies, we utilize a large battery of personality assessments to capture an accurate picture of each participant's personality. Other studies use a small number of personality traits in isolation. Human personality is complex and utilizing only one or a few of the acceptable personality trait assessments does not provide an accurate measure of an individual's personality. Several of the assessments we use have not been used in the existing literature including: self-monitoring, self-esteem, and Machiavellian tendency. Our results confirm some of the findings in the existing literature. We also offer evidence in support of correlations with previously unstudied personality traits.

3.3 Experimental Design

120 subjects were recruited via email to participate in five different experimental sessions. They received a $7.00 show up fee plus earnings based on their decisions in the experiment. Total payoffs, including the show up fee, averaged $28.35 for a session lasting approximately one hour and 45 minutes. Once all participants arrived for a session and their identities were verified, they were randomly divided into two groups. One group was then moved to another room. All games were played against anonymous partners and at no point did any participant know the identity of their partner or opponent. Each group, led by one of the experimenters, then played a dictator and ultimatum game. Alternating roles in bargaining games is known to affect behavior (Ben-Ner et al., 2004). In order to avoid this and isolate the impact of personality traits, subjects were either first or second movers in both games. For example, first movers in the dictator game are also first movers in the ultimatum game

The dictator game measures an individual's tendency toward altruism. The first mover decides how to split $10 with the second mover. The first mover is allowed to

give any whole dollar amount from $0 to $10 to the second mover. The second mover has no decision making power and simply accepts whatever amount the first mover decides to give him/her. The experimental instructions can be found in the appendix. Theoretically, first movers have no incentive to give up a single dollar. There are no retaliation strategies available to the second mover and no consequences for keeping the entire amount. However, experimental studies find that, on average, around 70% of dictators elect to give something and roughly 20% of dictators choose to give half of their initial allocation (Forsythe et al., 1994). In our sample, an average of $2.62 is given to the second player. Previous studies find that the threat of reciprocity in future games often provides incentives for dictators to give a portion of the $10. It is important to note that our experimental design removes any threat of reciprocity since each subject's opponent in the games in anonymous and randomly assigned. Also, payoffs are not calculated until after all decisions have been made and players have no idea in the game how their opponents behave.

After playing the dictator game, subjects play an ultimatum game. The ultimatum game builds upon the basic dictator game by giving the second mover a decision. As with the dictator game, the first mover decides how to split an initial $10 budget. However, the second mover can now decide whether to accept or reject the offer. If the second mover accepts the offer, each player receives a payoff equal to the first mover's proposal. If the second mover rejects the offer, then both players receive $0. The complete set of instructions can be found in the appendix. If individuals have self-regarding preferences, the second mover should be willing to accept any amount greater than $0 and should be indifferent between accepting an offer of $0 and rejecting an offer of $0. Previous studies find that second movers do not always behave as theory suggests. An offer of less than 20% of the initial budget tend to be rejected by 50% of second movers (Roth, 1995). Often, second movers feel that

a split is unfair and choose to punish the first mover for their inequitable proposal by rejecting the offer and forcing both players to receive \$0. We utilize the strategy method to record second mover decisions. The second mover is asked to indicate how they would behave for every possible proposal. This allows us to observe the entire strategy profile for each second mover. After making their decisions, first and second movers are randomly matched in order to determine payoffs.

After playing both games, subjects are asked to participate in a risk preference task to measure baseline risk preferences. We utilize the Holt-Laury risk lottery to quantify risk preferences. Individuals make ten decisions between paired lotteries, option A and option B. The lotteries are identical to Holt and Laury (2002) and can be found in the appendix. For the first decision, option A results in a gamble in which the player earns \$2.00 or \$1.60 and option B results in a gamble in which the player earns \$3.85 or \$0.10. For both gambles, the probability of the higher payoff is $\frac{1}{10}$. At each sequential decision, the probability of the higher payoff increases by $\frac{1}{10}$. For the last decision the gambles pay either \$2.00 or \$3.85 with one hundred percent certainty. This design allows us to easily measure risk preferences for each participant independent of their play in the stag hunt. Risk neutral players choose option A four times before switching to option B for the remainder of their decisions. The most risk-averse person should only switch to option B at the tenth decision and the most risk-loving person should choose option B every time. One possible criticism of this game is the low real payoffs that each participant faces. Holt and Laury (2002) conduct experimental sessions with payoffs as high as ninety times the payoffs we use. They find that individual risk preferences are very similar regardless of payoff size.

Finally, subjects are asked to complete a battery of personality trait assessments that measure the big five personality factors, self-monitoring, locus of control, self-esteem, and Machiavellian tendencies. Each of these personality traits are used in

the existing literature and are described in detail in Chapter II, which also contains a detailed overview of the actual survey instruments. The full set of assesments can be found in the appendix. Several studies investigate how noncognitive factors affect behavior in bargaining games. The current study attempts to contribute to the existing literature by uncovering additional noncognitive determinants of behavior for first and second movers in bargaining games.

3.4 Results and Discussion

3.4.1 Summary Statistics

Since individuals are assigned as first or second movers in both games, it is important to look at the behavior of these two groups separately. Figure 1 presents dictator allocation decisions, the amount sent to the receiver, in the dictator game. Roughly 70% of our sample chose to contribute a portion of their initial $10 in the dictator game which is similar to results in the existing literature (Forsythe et al., 1994). The average contribution is $2.62. These subjects also played the role of first movers, proposers, in the ultimatum game.[2] Figure 2 presents proposals made by first movers in the ultimatum game. Average contributions increased to $4.79, which is roughly an equal split of the initial allocation. This is also similar to findings in the literature.

Table 1 contains summary statistics for the first movers in our sample. The first section of the table presents the average allocation decisions for both games which are graphically presented in Figures 1 and 2.[3] Average risk preferences, measured using the Holt-Laury risk lottery are 5.717. This indicates that the average individual in the

[2]First movers are randomly assigned to different second movers between the dictator and ultimatum games.

[3]Observations are fewer than 60 due to missing ACT data.

first mover sample is slightly risk averse. The components of the big five personality inventory: neuroticism, extraversion, openness, agreeableness, and conscientiousness are all standardized, using the entire sample, to have a mean of 50 and a standard deviation of 10 in accordance with the existing literature (McCrae and Costa, 2004). The average individual in the first mover sample is just slightly different than the average for the entire experimental sample. The average self-monitoring score is 8.45 on a scale of 20. This indicates that the average individual in the first mover sample has slightly more low self-monitoring traits than high self-monitoring traits. The mean Machiavellianism score is 104.8 out of a possible 160. This is only slightly higher than the theoretical midpoint and indicates that the average first mover exhibits average Machiavellian tendencies. The average locus of control score is 12.2 out of 16, which indicates that the average first mover exhibits a slightly internal locus of control. The first mover sample also exhibits a high degree of self-esteem with a mean score on the RSES of 33.792 out of 40. The last section of Table 1 contains summary demographic statistics. Roughly 42% of first movers are female, 60.4% are Caucasian, and 34% are African-American. Their average age is 20.67 years old and age ranged from 18 to 43 years old. The average ACT score, a measure of cognitive ability, is 23.04.

Table 2 contains the summary statistics for second movers. The second movers have no decision to make in the dictator game and must decide whether to accept or reject proposals in the ultimatum game. Since we utilize the strategy method, we observe how each subject responds to every possible proposal. The first part of Table 2 presents the second mover acceptance rates in the ultimatum games. Figure 3 also contains the same information in a graphical representation. Roughly 21% of second movers accept a proposal of \$0, 70% accept an offer of \$1, 71% accept an offer of \$2, and 78% accept an offer of \$3. For offers greater than \$4 there is close to a 100% acceptance rate. These observations match well with findings in the existing

literature. If a first mover in our sample proposes to give the second mover 20% or less of the initial allocation, they face a 54% acceptance rate from second movers, a result similar to those in the existing literature.

The remainder of Table 2 contains summary statistics of second mover personality traits and a standard set of controls. The average score for each component of the big five is similar to those of first movers. The average self-monitoring score is 10.02 on a scale of 20. This indicates that the average individual in the second mover sample exhibits the same number of low and high self-monitoring traits. The mean Machiavellianism score is 110.865 out of a possible 160 which indicates that second movers exhibit average Machiavellian tendencies similar to first movers. The average locus of control score is 12.2 out of 16, which indicates that the average second mover, as with first movers, has a slightly internal locus of control. The second mover sample also exhibits a high degree of self-esteem with a mean score on the RSES of 34.3 out of 40. The last section of Table 2 contains summary demographic statistics. Roughly 58% of second movers are female, 67% are Caucasian, and 23% are African-American. Their average age is 19.8 years old and age ranged from 18 to 31 years old. The average ACT score is 23.23.

Individuals in our sample make choices remarkably similar to choices subjects make in previous studies. We also capture a wide range of personality data that we can incorporate into several regression models in order to estimates the impact of personality on bargaining behavior.

3.4.2 Regression Results

3.4.2.1 Dictators

Table 3 contains the estimated coefficient from a regression with the amount sent by first movers in the dictator game as the dependent variable and the set of per-

sonality traits, risk preference, and demographic controls as independent variables. Estimation is carried out using OLS.[4] The fit of the model is quite high compared to most of the literature with an R^2 of 0.44.[5]

Estimated coefficients for two components of the big five are statistically significant: openness and conscientiousness. Their estimated coefficients are both positive and significant at the 1% level. Openness is a measure of how receptive individuals are to new experiences and how likely they are to enjoy intellectual stimulation. Conscientiousness is a measure of an individual's need to do a task well. Becker et al. (2012) find that, for their experimental sample, conscientiousness is negatively correlated with dictator allocations. However, their sample consists of German students which may be quite different than our American student sample. The other three estimated coefficients for the components of the big five are relative small and not statistically significant from zero.

Of the other personality traits, locus of control is the only statistically significant result. A one point increase on the locus of control assessment is associated with a \$0.67 higher offer by a dictator. Unlike the other personality traits, locus of control is not measured from high to low, but rather from internal to external. Individuals with higher scores are considered to exhibit an internal locus of control while individuals with lower scores exhibit an external locus of control. At its core, locus of control is a measure of perceived control. Individuals with an external locus of control, referred to as *externals*, tend to view their lives as dictated by fate and their choices as a direct function of things outside of their control. Individuals with an internal locus of control, referred to as *internals*, tend to believe they are in control of their life outcomes and they contribute their success or failures to their own choices and actions.

[4]We also estimated models that included each of the personality traits in isolation to ensure that multicollinearity is not an issue. Estimates from these models can be found in Tables 6-9.

[5]Most regression models using bargaining experiments do not fit the data well with R^2 values often less than 0.10 (Ben-Ner et al. , 2004a).

More external (internal) locus of control appears to be associated with higher (lower) offers by dictators. This may be a direct result of their perceived control over the situation. Externals may feel like they are obligated to offer more since their choice is not solely in their control. They may feel like social norms or moral obligations require them to make higher offers in the dictator games. Externals may feel that their choices now will affect their fate later. Conversely, internals may be likely to offer less because they believe they have complete control of the situation and do not need to rely on cues from their surroundings to make decisions.

3.4.2.2 The Ultimatum Game

Table 4 contains parameter estimates from an OLS regression of proposal decisions in the ultimatum game. The amount proposed by first movers is the dependent variable and the personality traits, risk preference, and demographic variables are independent variables. We also include the allocation decision from the dictator game as a control for baseline altruism, which is a common practice in the literature (Leider et al., 2009).[6] The dictator allocation's estimated coefficient is positive and statistically significant at the 5% level. Individuals with higher levels of baseline altruism tend to contribute more to second movers in the ultimatum game. This result is similar to those found in the literature (Leider et al., 2009).

One of the five components of the big five personality model is statistically significant. Individuals with higher levels of extraversion contribute less to second movers. Since higher extraversion is associated with being inclined to social interaction and seeking gratification outside of self, this result seems counterintuitive. However, results from the related literature may offer some insight. Ben-Ner et al. (2008) find

[6]Since several personality traits appear to be correlated with dictator allocations, it is possible that multicollinearity may result in spurious standard errors. However, we estimate models with and without the dictator allocation as a control and the results were qualitatively similar for both parameter estimates and standard errors.

that, when real financial payoffs are used in a dictator game, high extraverts tend to become more selfish than when they play for hypothetical payoffs. They argue that high extraverts can "walk the walk, but not talk the talk." Extraversion is a measure of where individuals seek gratification, it does not necessarily reveal how individuals behave when faced with risky decisions. No other personality traits are statistically significant from zero.

Another variable of interest is risk preference. Its estimated coefficient is negative and significant at the 5% level. More risk averse first movers tend to offer a smaller amount to second movers. The role of risk preference in the decision is unclear. Unlike other games that have obvious risk decisions, the ultimatum game's riskiness is entirely dependent on the actions of the second mover. Since first movers do not observe this behavior, the amount of risk they face is entirely dependent on perceived risk. There are two sources of risk for first movers in the game. First, they risk losing everything by offering too low of a proposal if they assume that low offers will face higher rejection rates. Second, first movers also risk losing a larger portion of their initial budget if they propose too much to the second mover. Our result may indicate that risk averse indivdiuals are more concerned with losing larger portions of the initial budget than they are with the second mover rejecting their proposal. While this result is interesting, without larger samples and new game designs, it is not possible to causally link the risk preference scores to first mover behavior in the ultimatum game.

Since we utilize the strategy method to record second mover behavior, we are able to estimate models of second mover behavior at every proposal. Proposals of greater than \$3 received almost a 100% acceptance rate. Because of the lack of variation in subject decisions, we are unable to empirically investigate the determinants of behavior for decisions involving a proposal of \$4 to \$10. Table 5 contains the marginal

effects for a series of logistic regressions. Each column represents a separate regression where the dependent variable is an indicator variable that equals one if the proposal is accepted and equals zero if the proposal is rejected. For a proposal of $0, none of the variables of interest are statistically significant from zero. Personality and risk preferences do not appear to have any correlation with behavior when a second mover faces a proposal of $0. For the remaining proposals, $1 to $3, three of the personality traits are statistically significant and lead to similar behavior across the three models.

Individuals with higher measures of extraversion are less likely to accept a low offer. A one point higher extraversion score is associated with a 0.024 percentage point decrease in the probability of accepting a proposal of $1 or $2 and a 0.017 percentage point decrease in the probability of accepting a $3 proposal. This result suggests that second mover extraverts behave similarly to first mover extraverts. Extraverts tend to seek gratification from external sources including social interaction. However, they appear to be self-interested and prone to negative reciprocal behavior. This result is an extension of the findings of Ben-Ner et. al (2008) who find that extraverts tend to become very self interested when playing games for real stakes. Extraverts are likely to offer a smaller proposal than introverts, the main argument of Ben-Ner et al. (2008), but they also appear to engage in negative reciprocal behavior by preferring to receive nothing than take a low offer from proposers. None of the other big-five components' marginal effects are statistically significant from zero. However, two other personality traits seem to impact second mover decisions that have not been previously studied.

Machiavellianism is a measure of Machiavellian tendency with its foundations in *The Prince*. Individuals with high measures of Machiavellianism, *high machs*, tend to be self-interested and seek to maximize their own benefits at any cost (Christie and Geis, 1970). The results from Table 5 indicate that higher Machiavellianism

is associated with higher acceptance rates for low offers. A one point higher score on the Mach-IV assessment is associated with a 0.011 percentage point increase in the acceptance rate at a $1 proposal, a 0.014 percentage point increase for $2, and a 0.011 percentage point increase for $3. High machs, holding all else constant, are more likely to accept a low offer than the average individual. They are most interested in maximizing their own payoffs and probably realize that it does not serve their interests to engage in negative reciprocal behavior. They are less likely to experience negative emotions from a low offer that low or average machs may experience. This leads them to be more willing to accept a low offer.

Finally, self-monitoring also seems to have a relatively large impact on the acceptance rate for low offers. For proposals of $1 to $3, individuals with higher degrees of self-monitoring are more likely to accept, holding all else equal. A one point higher self-monitoring score is associated with a 0.076 percentage point increase in the probability of accepting a $1 proposal, a 0.074 percentage point increase in the probability of accepting $2, and a 0.038 percentage point increase in the probability of accepting $3. Self-monitoring is a measure of expressive control. High self-monitors are more vigilant of their behavior in social settings and adjust their behavior based on social cues. They are concerned with how they are perceived by others. Even though the games were played anonymously against randomly assigned opponents, high self-monitors may still feel the need to be perceived as socially acceptable. Therefore, they may be willing to accept a lower offer, not because they realize the benefit of having something as opposed to nothing, but because they feel that removing the payoff from their opponent is socially unacceptable.

3.5 Conclusion

Behavior in the dictator and ultimatum game is often counter to self-regarding preference assumptions that underline conventional economic theory. Subjects tend to be altruistic in the dictator game and concerned with equity in the ultimatum game. A number of recent studies attempt to utilize personality psychology to explain behavioral heterogeneity in bargaining experiments with mixed results. We contribute to the existing literature by utilizing a large battery of personality traits and uncover correlations between certain traits and bargaining behavior.

Our experiment consists of a dictator and ultimatum game, a set of personality assessments, and risk preference task. We utilize data gathered from five experimental sessions to estimate the effects of personality traits on decisions in the two bargaining games. We find that certain personality traits affect altruistic and reciprocal behavioral. Specifically, openness and conscientiousness are positively correlated with altruistic behavior in the dictator game. We also find that individuals with internal locus of control tend to be less altruistic, holding all else constant. In the ultimatum game, we find that extraversion and risk aversion are negatively correlated with offers made by first movers. Extraverts and risk averse individuals tend to offer smaller amount to second movers. The result for extraverts extends a previous finding by Ben-Ner et al. (2008) who find that extraverts tend to play more self-interested strategies in dictator games. Interpreting risk aversion's impact is more difficult. For second movers in the ultimatum game, we find that extraversion is associated with negative reciprocity, rejecting low offers from first movers as a form of punishment. We also find that Machiavellian tendencies and self-monitoring are significant predictors of second mover behavior. Both are associated with higher acceptance rates for low offers. By incorporating a large number of personality traits into our analysis, we

offer evidence that personality plays an important role in determining altruistic and reciprocal behavior.

REFERENCES

[1] Andreoni, J. Giving with impure altruism: Applications to charity and ricardian equivalence. *The Journal of Political Economy* (1989), 1447–1458.

[2] Becker, A., Deckers, T., Dohmen, T., Falk, A., and Kosse, F. The relationship between economic preferences and psychological personality measures. *IZA Discussion Paper* (2012).

[3] Ben-Ner, A., Kong, F., and Putterman, L. Share and share alike? gender-pairing, personality, and cognitive ability as determinants of giving. *Journal of Economic Psychology 25*, 5 (2004a), 581–589.

[4] Ben-Ner, A., Kramer, A., and Levy, O. Economic and hypothetical dictator game experiments: Incentive effects at the individual level. *Journal of Socio-Economics 37*, 5 (2008), 1775–1784.

[5] Ben-Ner, A., Putterman, L., Kong, F., and Magan, D. Reciprocity in a two-part dictator game. *Journal of Economic Behavior & Organization 53*, 3 (2004b), 333–352.

[6] Berg, J., Dickhaut, J., and McCabe, K. Trust, reciprocity, and social history. *Games and Economic Behavior 10*, 1 (1995), 122–142.

[7] Christie, R., Geis, F. L., and Berger, D. *Studies in Machiavellianism*. Academic Press New York, 1970.

[8] Fehr, E., and Schmidt, K. M. A theory of fairness, competition, and cooperation. *The Quarterly Journal of Economics 114*, 3 (1999), 817–868.

[9] Forsythe, R., Horowitz, J. L., Savin, N. E., and Sefton, M. Fairness in simple bargaining experiments. *Games and Economic behavior 6*, 3 (1994), 347–369.

[10] Gore, P. M., and Rotter, J. B. A personality correlate of social action. *Journal of Personality 31*, 1 (1963), 58–64.

[11] Güth, W., Schmittberger, R., and Schwarze, B. An experimental analysis of ultimatum bargaining. *Journal of Economic Behavior & Organization 3*, 4 (1982), 367–388.

[12] Harbaugh, W. T., Mayr, U., and Burghart, D. R. Neural responses to taxation and voluntary giving reveal motives for charitable donations. *Science 316*, 5831 (2007), 1622–1625.

[13] Holt, C., and Laury, S. Risk aversion and incentive effects. *American Economic Review 92*, 5 (2002), 1644–1655.

[14] Leider, S., Möbius, M. M., Rosenblat, T., and Do, Q.-A. Directed altruism and enforced reciprocity in social networks. *The Quarterly Journal of Economics 124*, 4 (2009), 1815–1851.

[15] McCrae, R. R., and Costa, P. T. A contemplated revision of the neo five-factor inventory. *Personality and Individual Differences 36*, 3 (2004), 587–596.

[16] Roth, A. E. Bargaining experiments. In *The handbook of experimental economics*, A. E. Roth and J. H. Kagel, Eds. Princeton university Press, 1995.

[17] Swope, K. J., Cadigan, J., Schmitt, P. M., and Shupp, R. Personality preferences in laboratory economics experiments. *The Journal of Socio-Economics 37*, 3 (2008), 998–1009.

[18] Thaler, R. H. Anomalies: The ultimatum game. *The Journal of Economic Perspectives 2*, 4 (1988), 195–206.

FIGURES AND TABLES

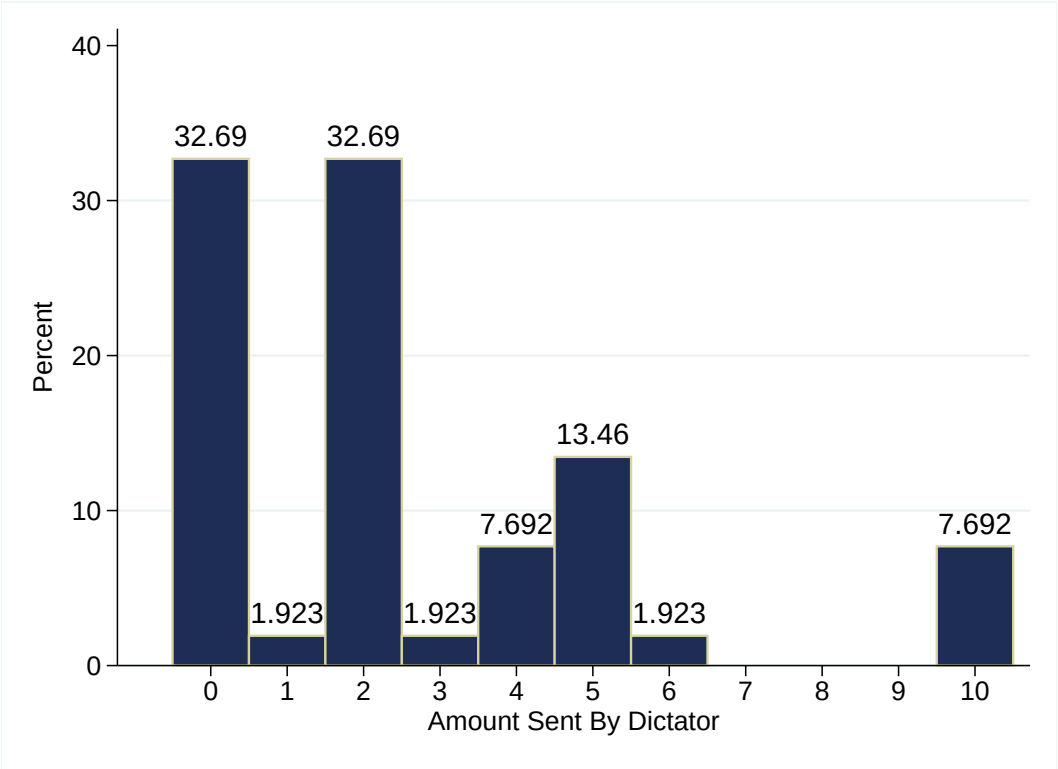

Figure 1: Amount Sent by Dictators

Notes: $N = 53$. Percentage of sample giving each allocation is presented above each bar.

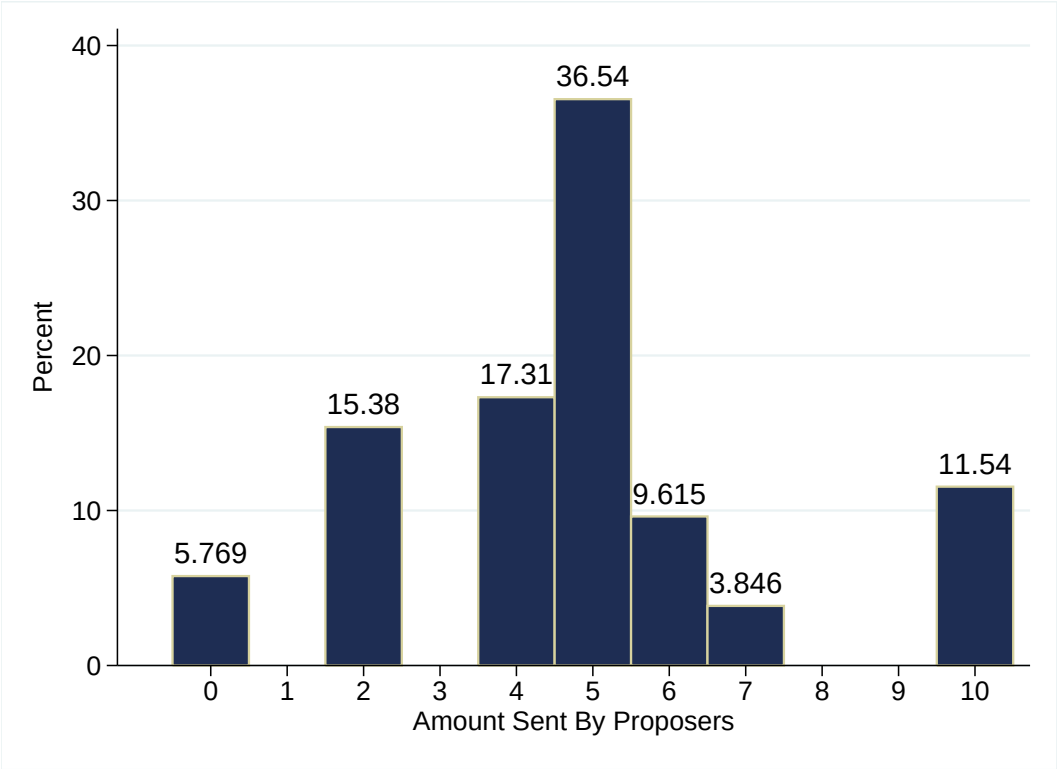

Figure 2: Amount Sent by Proposers in Ultimatum Game

Notes: $N = 53$. Percentage of sample giving each allocation is presented above each bar.

Table 1: Summary Statistics for First Movers

Variable	Mean	Std. Dev.	Min.	Max.
Amount Sent in Dictator Game	2.623	2.789	0.000	10.000
Amount Sent in Ultimatum Game	4.792	2.483	0.000	10.000
Risk Preference				
HL Risk Score	5.717	1.586	3.000	10.000
Personality Traits				
Neuroticism	51.511	10.210	33.944	77.848
Extraversion	48.285	9.713	22.094	66.580
Openness	49.527	11.280	25.554	72.745
Agreeableness	48.447	11.223	11.948	65.828
Conscientiousness	48.715	10.834	19.196	67.960
Self-Monitoring Score	8.849	3.629	3.000	17.000
Machiavellianism	104.750	18.528	59.000	134.000
Locus of Control	12.170	2.054	8.000	15.000
Self-Esteem	33.792	4.571	19.000	40.000
Other Controls				
Female	0.415	0.497	0.000	1.000
Caucasian	0.604	0.494	0.000	1.000
African-American	0.340	0.478	0.000	1.000
Age	20.679	4.910	18.000	43.000
ACT Score	23.038	4.005	16.000	33.000

Notes: $N = 53$. NEO-FFI measures have been standardized to have a mean of 50 and standard deviation of 10. Sample size is 53 instead of 60 because of missing ACT scores.

Table 2: Summary Statistics for Second Movers

Variable	Mean	Std. Dev.	Min.	Max.
Acceptance Rate in Ultimatum Game				
$0 sent	0.212	0.412	0.000	1.000
$1 sent	0.692	0.466	0.000	1.000
$2 sent	0.712	0.457	0.000	1.000
$3 sent	0.769	0.425	0.000	1.000
$4 sent	0.942	0.235	0.000	1.000
$5 sent	1.000	0.000	1.000	1.000
$6 sent	0.981	0.139	0.000	1.000
$7 sent	1.000	0.000	1.000	1.000
$8 sent	1.000	0.000	1.000	1.000
$9 sent	1.000	0.000	1.000	1.000
$10 sent	1.000	0.000	1.000	1.000
Risk Preference				
HL Risk Score	5.500	2.063	2.000	10.000
Personality Traits				
Neuroticism	48.460	9.636	32.653	75.266
Extraversion	51.748	10.078	23.682	68.169
Openness	50.483	8.585	28.503	68.321
Agreeableness	51.583	8.393	34.543	69.304
Conscientiousness	51.310	8.988	28.678	69.314
Self-Monitoring Score	10.019	3.227	2.000	16.200
Machiavellianism	110.865	12.916	78.000	134.000
Locus of Control	12.192	2.301	4.000	16.000
Self-Esteem	34.288	4.425	22.000	40.000
Other Controls				
Female	0.577	0.499	0.000	1.000
Caucasian	0.673	0.474	0.000	1.000
African-American	0.231	0.425	0.000	1.000
Age	19.865	2.301	18.000	31.000
ACT Score	23.231	3.439	16.000	35.000

Notes: $N = 52$. NEO-FFI measures have been standardized to have a mean of 50 and standard deviation of 10. Sample size is 53 instead of 60 because of missing ACT scores.

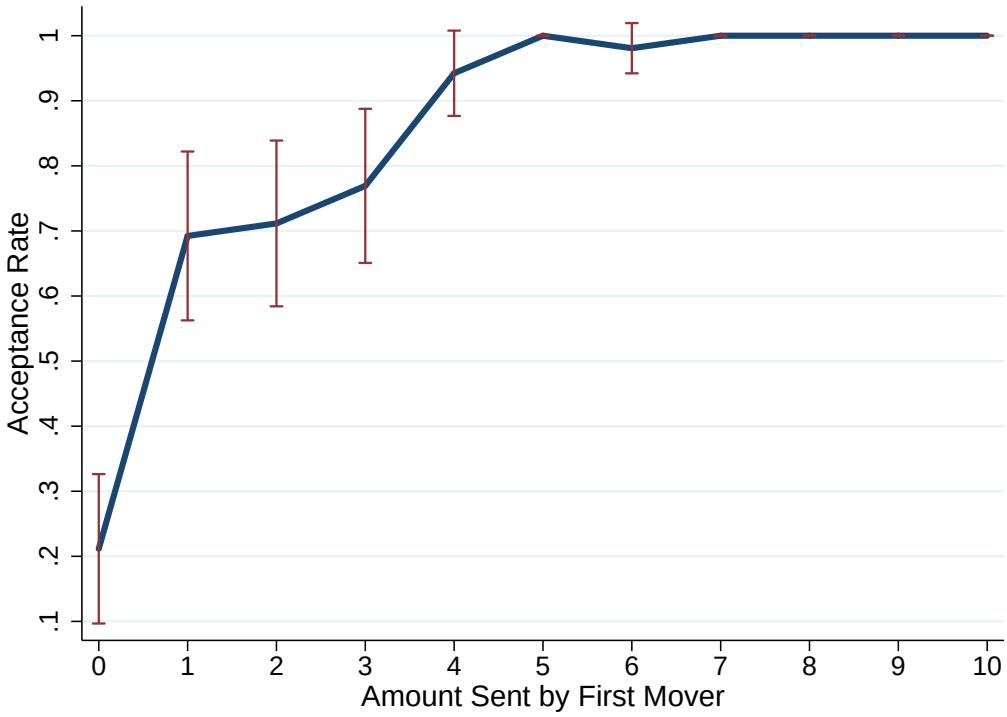

Figure 3: Second Mover Acceptance Rate

Notes: $N = 52$. Vertical lines indicate standard deviations.

Table 3: Regression Results for Amount Sent in Dictator Game

Variable	Coefficient
Neuroticism	-0.0653
	(0.0571)
Extraversion	-0.0113
	(0.0503)
Openness	0.0789***
	(0.0227)
Agreeableness	-0.0367
	(0.0698)
Conscientiousness	0.0965***
	(0.0340)
Self-Monitoring Score	-0.0333
	(0.1371)
Machiavellianism	0.0412
	(0.0330)
Locus of Control	-0.6716***
	(0.2062)
Self-Esteem	-0.1847
	(0.1473)
HL Risk Score	-0.2320
	(0.2378)
R^2	0.44

Notes: $N = 53$. Model estimation also includes a set of standard controls for race, sex, age, and ACT score. Robust standard errors are in parentheses. Robust standard errors are in parentheses. Legend: *denotes significant at the 10% level, **denotes significant at the 5% level, and ***denotes significant at the 1% level

Table 4: Regression Results for Amount Sent in Ultimatum Game

Variable	Coefficient
Amount Sent in Dictator Game	0.3250**
	(0.1207)
Neuroticism	-0.0554
	(0.0339)
Extraversion	-0.0878*
	(0.0446)
Openness	-0.0154
	(0.0429)
Agreeableness	0.0141
	(0.0509)
Conscientiousness	-0.0209
	(0.0412)
Self-Monitoring Score	-0.0046
	(0.1146)
Machiavellianism	0.0022
	(0.0295)
Locus of Control	0.1397
	(0.2055)
HL Risk Score	-0.4788**
	(0.2194)
R^2	0.42

Notes: $N = 53$. Model estimation also includes a set of standard controls for race, sex, age, and ACT score. Robust standard errors are in parentheses. Robust standard errors are in parentheses. Legend: *denotes significant at the 10% level, **denotes significant at the 5% level, and ***denotes significant at the 1% level

Table 5: Marginal Effects from Logistic Regression of Second Mover Acceptance Rates

Variable	Sent $0	Sent$1	Sent$2	Sent$3
Neuroticism	0.0039	0.0072	0.0041	0.0061
	(0.0069)	(0.0087)	(0.0078)	(0.0074)
Extraversion	-0.0018	-0.0241**	-0.0238**	-0.0168**
	(0.0061)	(0.0117)	(0.0115)	(0.0085)
Openness	0.0032	-0.0131	-0.0028	-0.0048
	(0.0083)	(0.0114)	(0.0104)	(0.0088)
Agreeableness	0.0003	0.0002	-0.0076	-0.0083
	(0.0097)	(0.0134)	(0.0126)	(0.0097)
Conscientiousness	0.0089	0.0097	0.0158*	0.0073
	(0.0077)	(0.0090)	(0.0082)	(0.0065)
Self-Monitoring Score	-0.0050	0.0755***	0.0741***	0.0377**
	(0.0225)	(0.0276)	(0.0256)	(0.0188)
Machiavellianism	-0.0011	0.0117*	0.0143**	0.0107**
	(0.0056)	(0.0065)	(0.0068)	(0.0048)
Locus of Control	-0.0219	0.0042	-0.0208	-0.0240
	(0.0350)	(0.0425)	(0.0361)	(0.0319)
Self-Esteem	0.0171	0.0305	0.0223	0.0183
	(0.0193)	(0.0265)	(0.0246)	(0.0207)
HL Risk Score	-0.0037	-0.0065	-0.0120	-0.0086
	(0.0326)	(0.0333)	(0.0282)	(0.0234)

Notes: $N = 52$. The models also include a set of standard controls for race, sex, age, and ACT score. Robust standard errors are in parentheses. Subjects choose to accept of reject each offer from $0 to $10. However, offers of $4 or more were almost universally accepted and offered no variation for regression analysis. Legend: *denotes significant at the 10% level, **denotes significant at the 5% level, and ***denotes significant at the 1% level

Table 6: Results for Amount Sent in Dictator Game (Separate Regressions)

Variable	With Risk	Without Risk
Neuroticism	-0.0250	-0.0233
	(0.0421)	(0.0418)
Extraversion	-0.0203	-0.0053
	(0.0426)	(0.0371)
Openness	0.0728**	0.0604*
	(0.0308)	(0.0328)
Agreeableness	0.0328	0.0269
	(0.0355)	(0.0369)
Conscientiousness	0.0938***	0.0912***
	(0.0305)	(0.0309)
Self-Monitoring Score	-0.0361	-0.0297
	(0.0945)	(0.0953)
Machiavellianism	0.0288	0.0317
	(0.0249)	(0.0255)
Locus of Control	-0.5388***	-0.5571***
	(0.1936)	(0.2022)
Self-Esteem	-0.0148	-0.0137
	(0.0919)	(0.0943)

Notes: $N = 53$. Each variable's coefficient is estimated in separate estimations. Model estimation also includes a set of standard controls for race, sex, age, and ACT score. Robust standard errors are in parentheses. Robust standard errors are in parentheses. Legend: *denotes significant at the 10% level, **denotes significant at the 5% level, and ***denotes significant at the 1% level

Table 7: Results for Amount Sent in Ultimatum Game (Separate Regressions)

Variable	With Risk	Without Risk
Neuroticism	-0.0477	-0.0444
	(0.0299)	(0.0329)
Extraversion	-0.0881**	-0.0711*
	(0.0355)	(0.0382)
Openness	-0.0193	-0.0367
	(0.0416)	(0.0389)
Agreeableness	0.0113	0.0030
	(0.0320)	(0.0311)
Conscientiousness	-0.0095	-0.0069
	(0.0271)	(0.0264)
Self-Monitoring Score	-0.0852	-0.0763
	(0.0796)	(0.0774)
Machiavellianism	-0.0013	0.0011
	(0.0169)	(0.0160)
Locus of Control	0.0325	0.0305
	(0.1361)	(0.1457)
Self-Esteem	-0.0128	-0.0109
	(0.0681)	(0.0669)

Notes: $N = 53$. Each variable's coefficient is estimated in separate estimations. Model estimation also includes a set of standard controls for race, sex, age, and ACT score. Robust standard errors are in parentheses. Robust standard errors are in parentheses. Legend: *denotes significant at the 10% level, **denotes significant at the 5% level, and ***denotes significant at the 1% level

Table 8: Marginal Effects on Second Mover Acceptance Rates With Risk

Variable	Sent $0	Sent$1	Sent$2	Sent$3
Neuroticism	0.0004	0.0031	0.0026	0.0042
	(0.0068)	(0.0071)	(0.0067)	(0.0061)
Extraversion	-0.0019	-0.0212*	-0.0205*	-0.0146**
	(0.0051)	(0.0105)	(0.0100)	(0.0075)
Openness	0.0007	-0.0104	-0.0050	-0.0070
	(0.0077)	(0.0097)	(0.0090)	(0.0090)
Agreeableness	0.0003	-0.0014	-0.0022	-0.0034
	(0.0067)	(0.0106)	(0.0103)	(0.0108)
Conscientiousness	0.0087	0.0061	0.0136*	0.0041
	(0.0071)	(0.0091)	(0.0068)	(0.0084)
Self-Monitoring Score	-0.0037	0.0477**	0.0385*	0.0266**
	(0.0169)	(0.0202)	(0.0220)	(0.0107)
Machiavellianism	-0.0016	0.0103*	0.0125**	0.0098*
	(0.0045)	(0.0054)	(0.0054)	(0.0047)
Locus of Control	-0.0075	0.0307	0.0210	-0.0040
	(0.0228)	(0.0323)	(0.0318)	(0.0318)
Self-Esteem	0.0096	0.0185	0.0141	0.0031
	(0.0151)	(0.0160)	(0.0147)	(0.0138)

Notes: $N = 52$. Each variable's marginal effect is estimated in separate estimations. The models also include a set of standard controls for race, sex, age, and ACT score. Robust standard errors are in parentheses. Subjects choose to accept of reject each offer from $0 to $10. However, offers of $4 or more were almost universally accepted and offered no variation for regression analysis. Legend: *denotes significant at the 10% level, **denotes significant at the 5% level, and ***denotes significant at the 1% level

Table 9: Marginal Effects on Second Mover Acceptance Rates Without Risk

Variable	Sent $0	Sent$1	Sent$2	Sent$3
Neuroticism	0.0006	0.0027	0.0021	0.0040
	(0.0071)	(0.0072)	(0.0068)	(0.0063)
Extraversion	-0.0016	-0.0148*	-0.0151*	-0.0141*
	(0.0052)	(0.0076)	(0.0075)	(0.0073)
Openness	0.0007	-0.0100	-0.0046	-0.0069
	(0.0076)	(0.0096)	(0.0091)	(0.0090)
Agreeableness	0.0000	-0.0013	-0.0022	-0.0033
	(0.0070)	(0.0107)	(0.0103)	(0.0107)
Conscientiousness	0.0087	0.0061	0.0090	0.0041
	(0.0070)	(0.0093)	(0.0088)	(0.0084)
Self-Monitoring Score	-0.0037	0.0778**	0.0385*	0.0366*
	(0.0168)	(0.0311)	(0.0227)	(0.0187)
Machiavellianism	-0.0015	0.0111*	0.0106*	0.0108**
	(0.0043)	(0.0052)	(0.0053)	(0.0046)
Locus of Control	-0.0087	0.0309	0.0228	-0.0034
	(0.0236)	(0.0312)	(0.0304)	(0.0313)
Self-Esteem	0.0098	0.0176	0.0132	0.0029
	(0.0147)	(0.0157)	(0.0144)	(0.0135)

Notes: $N = 52$. Each variable's marginal effect is estimated in separate estimations. The models also include a set of standard controls for race, sex, age, and ACT score. Robust standard errors are in parentheses. Subjects choose to accept of reject each offer from $0 to $10. However, offers of $4 or more were almost universally accepted and offered no variation for regression analysis. Legend: *denotes significant at the 10% level, **denotes significant at the 5% level, and ***denotes significant at the 1% level

CONCLUSION

This dissertation is composed of three essays that investigate the impact of noncognitive skills and factors on economic behaviors and outcomes. I investigate how social networking skills and personality affect labor market outcomes and decision making. The first essay utilizes empirical analysis on a nationally representative sample to find links between social networking skills and labor market outcomes. The last two essays utilize experimental techniques to investigate the role personality plays in risk taking under uncertainty, altruism, and reciprocity.

In the first chapter of this dissertation, entitled "The Effects of Social Networking Skills on Labor Market Outcomes," I investigate the impact of social networking skills on labor market outcomes. Utilizing data from the National Longitudinal Study of Adolescent Health, I calculate measures of popularity using real world social networks and use these measures in the several empirical models of future labor market outcomes. I find that they have statistically significant effects. I also find that the environment in which skills develop help determine the skills usefulness later in life. The remainder of the dissertation focuses on the noncognitive determinants of behavior in economic experiments.

In the second chapter, entitled "The Noncognitive Determinants of Strategic Risk Taking: Responsibility in the Stag Hunt," I study the impact of personality on risk taking behavior in the presence of responsibility. I conduct a series of experiments on human subjects designed to measure differences in risk taking behavior when subjects are only responsible for their own outcomes and when they are responsible for other's outcomes. I find limited support for the hypothesis that personality traits predict risk taking behavior in the stag hunt. However, I uncover strong correlations between revealed risk preferences and behavior in the stag hunt.

In the third and final chapter, entitled "Personality, Altruism, and Reciprocity," I investigate personality's role in determining altruistic and reciprocal behavior using a dictator and ultimatum game. Subjects play the popular dictator and ultimatum games followed by completing a battery of personality trait assessments. Results indicate that personality significantly impacts altruistic and negative reciprocal behavior. Several of the findings are similar to those in the existing literature. I also find previously unstudied correlations between a number of personality traits and reciprocal behavior. The results in all three papers suggest that noncognitive factor play an important role in determining economic outcomes and behaviors.

APPENDICES

APPENDIX A: Letter of IRB Approval

April 1, 2011

Mark F. Owens, Robert Girtz, Joshua Hill
Department of Economics and Finance
mfowens@mtsu.edu

Protocol Title: "Non-cognitive factors and social networks"

Protocol Number: 11-281

Dear Investigator(s),

The MTSU Institutional Review Board, or a representative of the IRB, has reviewed the research proposal identified above. The MTSU IRB or its representative has determined that the study poses minimal risk to participants and qualifies for an expedited review under 45 CFR 46.110 Category 7.

Approval is granted for one (1) year from the date of this letter for 500 participants.

According to MTSU Policy, a researcher is defined as anyone who works with data or has contact with participants. Anyone meeting this definition needs to be listed on the protocol and needs to provide a certificate of training to the Office of Compliance. **If you add researchers to an approved project, please forward an updated list of researchers and their certificates of training to the Office of Compliance (c/o Emily Born, Box 134) before they begin to work on the project.** Any change to the protocol must be submitted to the IRB before implementing this change.

Please note that any unanticipated harms to participants or adverse events must be reported to the Office of Compliance at (615) 494-8918.

You will need to submit an end-of-project form to the Office of Compliance upon completion of your research located on the IRB website. Complete research means that you have finished collecting and analyzing data. **Should you not finish your research within the one (1) year period, you must submit a Progress Report and request a continuation prior to the expiration date.** Please allow time for review and requested revisions. Your study expires **April 1, 2012**.

Also, all research materials must be retained by the PI or faculty advisor (if the PI is a student) for at least three (3) years after study completion. Should you have any questions or need additional information, please do not hesitate to contact me.

Sincerely,

Emily Born
Compliance Officer
Middle Tennessee State University
eborn@mtsu.edu

APPENDIX B: Experimental Instructions–Stag Hunt

Instructions for Play For Self (PFS) Game:

In this game you will decide whether to choose Option A or B. Your payoff will be based on your decision and the decision of another randomly matched participant in the other room.

PAYOFFS:

- If you choose Option A and the other player also chooses Option A, then both players will receive a payoff of $5.
- If you choose Option A and the other player chooses Option B, then you will receive $1 and the other player will receive $4.
- If you choose Option B and the other player chooses Option A, then you will receive $4 and the other player will receive $1.
- If you choose Option B and the other player also chooses Option B, then both players will receive $4.

The payoffs can be viewed as follows:

		Other Subject	
		Option A	Option B
You	Option A	5 , 5	1 , 4
	Option B	4 , 1	4 , 4

Instructions for Play For Pair (PFP) Game:

Now, there will be a slight change to this exercise and now you are playing this game with a participant in the other room.

INSTRUCTIONS FOR PLAYERS IN ROOM Y: If you are in ROOM Y, then you can only accept the outcome from the decision of your partner in ROOM X. You will not have an option to offer input into the decision.

INSTRUCTIONS FOR PLAYERS IN ROOM X: If you are in ROOM X, then you will decide on which outcome to play. Your payoff will not only affect you, but also your partner in ROOM Y.

You will decide between Option A and Option B. Your payoffs will be determined by your decision, and the decision of another team you are playing against.

PAYOFFS:

- If you choose Option A and the other team also chooses Option A, then both teams will receive a payoff of $5.
- If you choose Option A and the other team chooses Option B, then your team will receive $1 and the other team will receive $4.
- If you choose Option B and the other team chooses Option A, then your team will receive $4 and the other team will receive $1.
- If you choose Option B and the other team also chooses Option B, then both teams will receive $4.

The payoffs can be viewed as follows:

		Other Team	
		Option A	Option B
Your Team	Option A	5 , 5	1 , 4
	Option B	4 , 1	4 , 4

APPENDIX C: Experimental Instructions–Personality Assessments

Appendix C contains the battery of personality survey instruments used in Chapters II and III:

- NEO-FFI
- Mach-IV
- Locus of Control
- Rosenberg Self-Esteem Scale
- Snyder Self-Monitoring

NEO-FFI:

Instructions: Read each statement carefully. For each statement, circle the response that best represents your opinion.

Circle SD if you Strongly Disagree with the statement, or if the statement is definitely false.
Circle D if you Disagree or the statement is mostly false.
Circle N if you are Neutral on the statement, you cannot decide, or the statement is about equally true and false.
Circle A if you Agree or the statement is mostly true.
Circle SA if you Strongly Agree or the statement is definitely true.

Circle ONE response for each statement. Respond to all of the statements, making sure that you circle the correct response.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I am not a worrier	SD	D	N	A	SA
2. I like to have a lot of people around me	SD	D	N	A	SA
3. I don't like to waste my time daydreaming	SD	D	N	A	SA
4. I try to be courteous to everyone I meet	SD	D	N	A	SA
5. I keep my belongings clean and neat	SD	D	N	A	SA
6. I often feel inferior to others	SD	D	N	A	SA
7. I laugh easily	SD	D	N	A	SA
8. Once I find the right way to do something, I stick to it	SD	D	N	A	SA
9. I often get into arguments with my family and co-workers	SD	D	N	A	SA
10. I'm pretty good about pacing myself so as to get things done on time	SD	D	N	A	SA
11. When I'm under a great deal of stress, sometimes I feel like I'm going to pieces	SD	D	N	A	SA
12. I don't consider myself especially "lighthearted"	SD	D	N	A	SA
13. I am intrigued by patterns I find in art and nature	SD	D	N	A	SA
14. Some people think I'm selfish and egotistical	SD	D	N	A	SA
15. I am not a very methodical person	SD	D	N	A	SA
16. I rarely feel lonely or blue	SD	D	N	A	SA
17. I really enjoy talking with people	SD	D	N	A	SA
18. I believe letting students hear controversial speakers can only confuse and mislead them	SD	D	N	A	SA
19. I would rather cooperate with others than compete with them	SD	D	N	A	SA
20. I try to perform all the tasks assigned to me conscientiously	SD	D	N	A	SA
21. I often feel tense and jittery	SD	D	N	A	SA
22. I like to be where the action is	SD	D	N	A	SA

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
23. Poetry has little or no effect on me	SD	D	N	A	SA
24. I tend to be cynical and skeptical of other's intentions	SD	D	N	A	SA
25. I have a clear set of goals and work towards them in an orderly fashion	SD	D	N	A	SA
26. Sometimes I feel completely worthless	SD	D	N	A	SA
27. I usually prefer to do things alone	SD	D	N	A	SA
28. I often try new and foreign foods	SD	D	N	A	SA
29. I believe that most people will take advantage of you if you let them	SD	D	N	A	SA
30. I waste a lot of time before settling down to work	SD	D	N	A	SA
31. I rarely feel fearful or anxious	SD	D	N	A	SA
32. I often feel as if I'm bursting with energy	SD	D	N	A	SA
33. I seldom notice the moods or feelings that different environments produce	SD	D	N	A	SA
34. Most people I know like me	SD	D	N	A	SA
35. I work hard to accomplish my goals	SD	D	N	A	SA
36. I often get angry at the way people treat me	SD	D	N	A	SA
37. I am a cheerful, high-spirited person	SD	D	N	A	SA
38. I believe we should look to our religious authorities for decisions on moral issues	SD	D	N	A	SA
39. Some people think of me as cold and calculating	SD	D	N	A	SA
40. When I make a commitment, I can always be counted on to follow through	SD	D	N	A	SA
41. Too often, when things go wrong, I get discouraged and feel like giving up	SD	D	N	A	SA
42. I am not a cheerful optimist	SD	D	N	A	SA
43. Sometimes when I am reading poetry or looking at a work of art, I feel a chill or wave of excitement	SD	D	N	A	SA
44. I'm hardheaded and toughminded in my attitudes	SD	D	N	A	SA
45. Sometimes I'm not as dependable or reliable as I should be	SD	D	N	A	SA
46. I am seldom sad or depressed	SD	D	N	A	SA
47. My life is fast-paced	SD	D	N	A	SA
48. I have little interest in speculating on the nature of the universe or the human condition	SD	D	N	A	SA
49. I generally try to be thoughtful and considerate	SD	D	N	A	SA
50. I am a productive person who always gets the job done	SD	D	N	A	SA

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
51. I often feel helpless and want someone else to solve my problems	SD	D	N	A	SA
52. I am a very active person	SD	D	N	A	SA
53 .I have a lot of intellectual curiosity	SD	D	N	A	SA
54. If I don't like people, I let them know it	SD	D	N	A	SA
55. I never seem to be able to get organized	SD	D	N	A	SA
56. At times I have been so ashamed I just wanted to hide	SD	D	N	A	SA
57. I would rather go my own way than be a leader of others	SD	D	N	A	SA
58. I often enjoy playing with theories or abstract ideas	SD	D	N	A	SA
59. If necessary, I am willing to manipulate people to get what I want	SD	D	N	A	SA
60. I strive for excellence in everything I do	SD	D	N	A	SA

Mach-IV:

Please rate your response to each question on the following scale and circle the response that best represents your opinion.

strongly agree	somewhat agree	slightly agree	no opinion	slightly disagree	somewhat disagree	strongly disagree

1. Never tell anyone the real reason you did something unless it is useful to do so.

strongly agree	somewhat agree	slightly agree	no opinion	slightly disagree	somewhat disagree	strongly disagree

2. The best way to handle people is to tell them what they want to hear.

strongly agree	somewhat agree	slightly agree	no opinion	slightly disagree	somewhat disagree	strongly disagree

3. One should take action only when sure it is morally right.

strongly agree	somewhat agree	slightly agree	no opinion	slightly disagree	somewhat disagree	strongly disagree

4. Most people are basically good and kind.

strongly agree	somewhat agree	slightly agree	no opinion	slightly disagree	somewhat disagree	strongly disagree

5. It is safest to assume that all people have a vicious streak and it will come out when they are given a chance.

strongly agree	somewhat agree	slightly agree	no opinion	slightly disagree	somewhat disagree	strongly disagree

6. Honesty is the best policy in all cases.

strongly agree	somewhat agree	slightly agree	no opinion	slightly disagree	somewhat disagree	strongly disagree

7. There is no excuse for lying to someone else.

strongly agree	somewhat agree	slightly agree	no opinion	slightly disagree	somewhat disagree	strongly disagree

8. It is hard to get ahead without cutting corners here and there.

strongly agree	somewhat agree	slightly agree	no opinion	slightly disagree	somewhat disagree	strongly disagree

9. All in all, it is better to be humble and honest than important and dishonest.

strongly agree	somewhat agree	slightly agree	no opinion	slightly disagree	somewhat disagree	strongly disagree

10. When you ask someone to do something for you, it is best to give the real reasons for wanting it rather than giving reasons that carry more weight.

strongly agree	somewhat agree	slightly agree	no opinion	slightly disagree	somewhat disagree	strongly disagree

11. Most people who get ahead in the world lead clean, moral lives.

strongly agree	somewhat agree	slightly agree	no opinion	slightly disagree	somewhat disagree	strongly disagree

12. Anyone who completely trusts anyone else is asking for trouble.

strongly agree	somewhat agree	slightly agree	no opinion	slightly disagree	somewhat disagree	strongly disagree

13. The biggest difference between most criminals and other people is that criminals are stupid enough to get caught.

strongly agree	somewhat agree	slightly agree	no opinion	slightly disagree	somewhat disagree	strongly disagree

14. Most men are brave.

strongly agree	somewhat agree	slightly agree	no opinion	slightly disagree	somewhat disagree	strongly disagree

15. It is wise to flatter important people.

strongly agree	somewhat agree	slightly agree	no opinion	slightly disagree	somewhat disagree	strongly disagree

16. It is possible to be good in all respects.

strongly agree	somewhat agree	slightly agree	no opinion	slightly disagree	somewhat disagree	strongly disagree

17. Barnum was very wrong when he said that there’s a sucker born every minute.

strongly agree	somewhat agree	slightly agree	no opinion	slightly disagree	somewhat disagree	strongly disagree

18. Generally speaking, men won't work hard unless they're forced to do so.

strongly agree	somewhat agree	slightly agree	no opinion	slightly disagree	somewhat disagree	strongly disagree

19. People suffering from incurable diseases should have the choice of being put painlessly to death.

strongly agree	somewhat agree	slightly agree	no opinion	slightly disagree	somewhat disagree	strongly disagree

20. Most men forget more easily the death of their father than the loss of their property.

strongly agree	somewhat agree	slightly agree	no opinion	slightly disagree	somewhat disagree	strongly disagree

Locus of Control:

For each pair, please read statement A and statement B and circle the statement which is closer to your opinion. Then after circling the statement that is closer to your opinion circle whether the statement you selected is much closer to your opinion or slightly closer.

1. A. What happens to me is my own doing

   B. Sometimes I feel that I do not have enough control over the direction my life is taking.

The statement that I circled is much closer slightly closer to my opinion.

2. A. When I make plans, I am almost certain that I can make them work.

   B. It is not always wise to plan too far ahead, because many things turn out to be a matter of good or bad fortune anyhow.

The statement that I circled is much closer slightly closer to my opinion.

3. A. In my case, getting what I want has little or nothing to do with luck.

   B. Many times, we might just as well decide what to do by flipping a coin.

The statement that I circled is much closer slightly closer to my opinion.

4. A. Many times, I feel that I have little influence over the things that happen to me.

   B. It is impossible for me to believe that chance or luck plays an important role in my life.

The statement that I circled is much closer slightly closer to my opinion.

Rosenberg Self-Esteem Scale:

For the following ten statements, please rank the way you feel about it on the following scale and circle the response that best represents your opinion.

strongly agree agree disagree strongly disagree

1. I am a person of worth.

strongly agree agree disagree strongly disagree

2. I have a number of good qualities.

strongly agree agree disagree strongly disagree

3. I am inclined to feel that I am a failure.

strongly agree agree disagree strongly disagree

4. I am as capable as others.

strongly agree agree disagree strongly disagree

5. I feel I do not have much to be proud of.

strongly agree agree disagree strongly disagree

6. I have a positive attitude.

strongly agree agree disagree strongly disagree

7. I am satisfied with myself.

strongly agree agree disagree strongly disagree

8. I wish I had more self respect.

strongly agree agree disagree strongly disagree

9. I feel useless at times.

strongly agree agree disagree strongly disagree

10. I sometimes think I am “no good” at all.

strongly agree agree disagree strongly disagree

Snyder Self-Monitoring Scale :

For the following statements, please circle True or False to indicate whether you agree with it or not.

1. I find it hard to imitate the behavior of other people.

True False

2. At parties and social gatherings, I do not attempt to do or say things that others will like.

True False

3. I can argue only for ideas that I already believe.

True False

4. I can make impromptu speeches even on topics about which I have almost no information.

True False

5. I guess I put on a show to impress or entertain others.

True False

6. I would probably make a good actor.

True False

7. In a group of people, I am rarely the center of attention

True False

8. In different situations and with different people, I often act like very different persons.

True False

9. I am not particularly good at making other people like me.

True False

10. I'm not always the person I appear to be.

True False

11. I would not change my opinions (or the way I do things) in order to please someone or win his or her favor.

True False

12. I have considered being an entertainer.

True False

13. I have never been good at games such as charades and improvisational acting.

True False

14. I have trouble changing my behavior to suit different people and different situations.

True False

15. At a party I let others keep the jokes and stories going.

True False

16. I feel a bit awkward in company and do not come across quite as well as I should.

True False

17. I can look anyone in the eye and tell a lie with a straight face (if for the right end).

True False

18. I may deceive people by being friendly when I really dislike them.

True False

APPENDIX D: Experimental Instructions–Bargaining Games and Risk Lottery

Appendix D contains the set of games played for Chapter III:

- The Dictator Game
- The Ultimatum Game
- The Holt-Laury Risk Lottery

Dictator Game:

You have been matched with a person in the other room. This is a different person from before.

Now players in ROOM X start out with 10 experimental dollars and players in ROOM Y start out with ZERO experimental dollars

INSTRUCTIONS FOR PLAYERS IN ROOM Y
If you are in ROOM Y, then you will simply receive the payoff that your partner in ROOM X decides upon. You will play no active role in this experiment.

INSTRUCTIONS FOR PLAYERS IN ROOM X
If you are in ROOM X, then you must decide whether to send all, some, or none of your 10 experimental dollars to your partner in ROOM Y. You may allocate any amount of money to the receiver from $0 to $10 in $1 increments.

How much would you like to send to the participant in ROOM Y? Remember: your decision must be between 0 and 10 in increments of 1.

_____

Ultimatum Game:

As previously, you are again matched with a player in the other room.

INSTRUCTIONS FOR PLAYERS in ROOM X

If you are in ROOM X, you start out with 10 experimental dollars. You may allocate any amount of money to your partner in ROOM Y from 0 to 10 in increments of 1. Your partner in ROOM Y will then decide whether to accept or reject your offer. If the offer is accepted, then your payoff is equal to 10 minus how much you sent your partner. If the offer is rejected, then you and your partner's payoff will be 0 experimental dollars.

INSTRUCTIONS FOR PLAYERS in ROOM Y

If you are in ROOM Y, your partner in ROOM X decides whether to offer you some, all, or none of their starting 10 experimental dollars. If you accept the offer, then your payoff will be equal to how much your partner offers. If you reject the offer, then you and your partner's payoff will be 0 experimental dollars.

Players in ROOM X will complete the following form :

How much would you like to send to the participant in ROOM Y? Remember: your decision must be between 0 and 10 in increments of 1. _____

Players in ROOM Y will complete the following form:

Please indicate your choice for each:

Would you accept or reject an offer of 0?	_____accept	_____reject
Would you accept or reject an offer of 1?	_____accept	_____reject
Would you accept or reject an offer of 2?	_____accept	_____reject
Would you accept or reject an offer of 3?	_____accept	_____reject
Would you accept or reject an offer of 4?	_____accept	_____reject
Would you accept or reject an offer of 5?	_____accept	_____reject
Would you accept or reject an offer of 6?	_____accept	_____reject
Would you accept or reject an offer of 7?	_____accept	_____reject
Would you accept or reject an offer of 8?	_____accept	_____reject
Would you accept or reject an offer of 9?	_____accept	_____reject
Would you accept or reject an offer of 10?	_____accept	_____reject

Holt-Laury Risk Lottery

Unlike the previous exercises, this one will be played alone. You will not have a partner in this game.

Your decision sheet shows ten decisions listed on the left. Each decision is a paired choice between "Option A" and "Option B." You will make ten choices and record these in the final column, but only one of them will be used in the end to determine your earnings. Before you start making your ten choices, please let me explain how these choices will affect your earnings for this part of the experiment.

Here is a ten-sided die that will be used to determine payoffs; the faces are numbered from 1 to 10 (the "0" face of the die will serve as 10.) After you have made all of your choices, we will throw this die twice, once to select one of the ten decisions to be used, and a second time to determine what your payoff is for the option you chose, A or B, for the particular decision selected. Even though you will make ten decisions, only one of these will end up affecting your earnings, but you will not know in advance which decision will be used. Obviously, each decision has an equal chance of being used in the end.

Now, please look at Decision 1 at the top. Option A pays 200 pennies if the throw of the ten sided die is 1, and it pays 160 pennies if the throw is 2-10. Option B yields 385 pennies if the throw of the die is 1, and it pays 10 pennies if the throw is 2-10. The other Decisions are similar, except that as you move down the table, the chances of the higher payoff for each option increase. In fact, for Decision 10 in the bottom row, the die will not be needed since each option pays the highest payoff for sure, so your choice here is between 200 pennies or 385 pennies.

To summarize, you will make ten choices: for each decision row you will have to choose between Option A and Option B. You may choose A for some decision rows and B for other rows, and you may change your decisions and make them in any order. When everyone is finished, we will throw the ten-sided die to select which of the ten Decisions will be used. Then we will throw the die again to determine your money earnings for the Option you chose for that Decision. Earnings (in pennies) for this choice will be added to your previous earnings, and you will be paid all earnings in cash when we finish.

So now please look at the empty boxes on the right side of the record sheet. You will have to write a decision, A or B in each of these boxes, and then the die throw will determine which one is going to count. We will look at the decision that you made for the choice that counts, and circle it, before throwing the die again to determine your earnings for this part. Then you will write your earnings in the blank at the bottom of the page.

DECISION SHEET:

	Option A		Option B		Mark Selection A or B Here
1.	1/10 of $2.00	9/10 of $1.60	1/10 of $3.85	9/10 of $0.10	_____
2.	2/10 of $2.00	8/10 of $1.60	2/10 of $3.85	8/10 of $0.10	_____
3.	3/10 of $2.00	7/10 of $1.60	3/10 of $3.85	7/10 of $0.10	_____
4.	4/10 of $2.00	6/10 of $1.60	4/10 of $3.85	6/10 of $0.10	_____
5.	5/10 of $2.00	5/10 of $1.60	5/10 of $3.85	5/10 of $0.10	_____
6.	6/10 of $2.00	4/10 of $1.60	6/10 of $3.85	4/10 of $0.10	_____
7.	7/10 of $2.00	3/10 of $1.60	7/10 of $3.85	3/10 of $0.10	_____
8.	8/10 of $2.00	2/10 of $1.60	8/10 of $3.85	2/10 of $0.10	_____
9.	9/10 of $2.00	1/10 of $1.60	9/10 of $3.85	1/10 of $0.10	_____
10.	10/10 of $2.00	0/10 of $1.60	10/10 of $3.85	0/10 of $0.10	_____