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The Effect of Pay Transparency on Narcissists: Can Personality Type Predict Reciprocity?

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B.A. Emory University, 2011

Advisor: Kristy Towry, Ph.D.

An abstract of
A dissertation submitted to the Faculty of the
James T. Laney School of Graduate Studies of Emory University
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Abstract:

Government regulations and popular media push companies to be more transparent about employee wage information. Yet, companies often attempt to keep salary information secret because, when wage dispersion exists, transparency decreases total employee productivity. The fair-wage effort hypothesis (FWEH) models this phenomenon (Akerlof and Yellen 1990). Productivity decreases because, *on average*, when employees learn they are paid less than others, they engage in negative reciprocity, lowering their productivity. At the same time, *on average*, employees who learn they are paid more than others do not engage in positive reciprocity. I investigate whether narcissism can predict individual employees' reciprocal responses after they learn they are being paid more or less than their coworkers. Narcissists may feel more entitled to rewards and may be more likely to seek revenge for perceived injustices than nonnarcissists. I test the hypotheses using an experiment on Amazon Mechanical Turk in which I manipulate pay level and transparency. I find that the FWEH accurately describes average behavior. However, narcissism moderates the strength of individual employees' reciprocal responses, increasing the magnitude of negative reciprocity and decreasing the magnitude of positive reciprocity.

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1. Introduction

Most companies keep employee salary information private, but new government regulations and online media like Glassdoor.com are forcing companies to become more transparent about pay (Exec. Order No. 13665, 3 2014). The trend may be problematic for companies that vary pay for employees doing the same job and thus engage in horizontal wage dispersion. Companies often attempt to hide this type of dispersion because, if revealed, it can lead to a lower combined total of employee productivity (Akerlof and Yellen 1990). This phenomenon is modeled by the fair-wage effort hypothesis (FWEH), which has two main predictions: that those who learn they are paid less than others will decrease productivity and that those who learn they are paid more than or equal to others will not increase productivity. While laboratory and field experiments support the model's predictions, on average, individual responses are frequently inconsistent with these predictions (Cohn et al. 2014; Gächter and Thöni 2010).

In this paper, I argue that narcissism at least partially explains the heterogeneity of responses to pay transparency. That is, while Gächter and Thöni (2010) identify and classify individual behavior patterns ex post, I predict these patterns based on a measure of narcissism. The personality trait of narcissism is characterized by entitled self-importance, meaning that those who are more narcissistic view their own needs and goals as more significant than others and have an inflated sense of importance and deservingness (Krizan and Herlache 2017). The trait is normally distributed within the human population (Raskin and Terry 1988). Throughout

this paper, I will refer to employees who are higher in narcissism as narcissists and those lower in the trait as nonnarcissists.[1]

The FWEH is based on the notion that pay transparency enables employees to use horizontal wage comparisons to judge whether they are being underpaid or overpaid, relative to their coworkers. Once the employees can make these comparisons, the FWEH predicts that the reciprocal responses will be asymmetric. Those who are underpaid will react with negative reciprocity, decreasing productivity, but those who are overpaid will not respond with positive reciprocity (Falk and Fischbacher 2006). I predict that, when employees discover they are paid less than others, narcissists will respond with more negative reciprocity than nonnarcissists. However, when employees discover they are paid more than others, narcissists will exhibit less positive reciprocity than nonnarcissists. The differing strengths of the reciprocal responses arise due to narcissists feeling more entitled to rewards and being more revenge-seeking than nonnarcissists (Emmons 1984; Kohut 1972; Twenge and Campbell 2003).

I focus on narcissism and not a different personality trait for three reasons. (1) The trait has a significant correlation with negative behaviors in the workplace. (2) Managers may be able to use their knowledge of the trait to design better control systems. (3) It is increasingly prevalent in society and thus workplaces. Psychologists have demonstrated a strong link between narcissism and counterproductive workplace behaviors (Forsyth et al. 2012; Cohen 2016). Meta analyses glean that the trait has greater predictive power for destructive behavior in the workplace than other related traits, like psychopathy and Machiavellianism, and is incrementally predictive over the big-five personality traits (Grijalva and Newman 2015). These studies

[1] The term narcissist in this paper does not refer exclusively to someone suffering from narcissistic personality disorder, which is a clinical diagnosis. Those suffering from this diagnosis are in the far-right tail of the distribution of narcissistic traits in society (Krizan and Herlache 2017).

provide a strong foundation on which to build my predictions and speak to how and why narcissism matters in the modern workplace.

Second, managers can realistically use knowledge of narcissism to predict behavior. Predictions do not require giving employees personality tests and designing individual control systems because narcissists cluster in job roles and at firms (Jonason et al. 2014). Narcissists cluster by self-selecting into different educational majors and desiring different job types (Kowalski et al. 2017; Vedel and Thomsen 2017). Narcissism is also a predictive factor in job satisfaction based on different job attributes (Jonason et. al 2015). Finding satisfaction in different ways indicates that not only do narcissists select into different jobs than their peers, they also self-select out of roles that do not satisfy their personalities' desires. The two forces of self-selection into and out of firms leads to clustering by personality type.

Because of this clustering, the effects of narcissists are magnified or mitigated, based on where they self-select into firms. Narcissists are drawn to artistic, social, adventurous, and business-related fields. They often desire riskier compensation schemes, with more variable pay. Managers may be able to predict which roles and which firms will attract more or fewer narcissists. They can then use this knowledge to design control systems that better fit the personality type of likely employees. Tailoring control systems to personality types would be similar to how managers use the firm cultural characteristics to design control systems currently.

Third, narcissism is important to understand because many argue that Millennials have been shown to have a higher average level of the trait than people in the generations before them[2] (Twenge et al. 2008a; Twenge et al. 2008b; Twenge and Campbell 2009). Since

[2] The Twenge et al. (2008a) finding that there are rising levels of narcissism in Millennials is a contentious finding in psychology. Twenge et al. (2008a and 2008b) documented this effect, but other researchers find no effect and claim that the sample selection was flawed (Trzesniewski et al. 2008;

Millennials are becoming the largest segment of the labor population, it is important to know whether they will react to management control systems differently than previous generations did. Young et al. (2016) call for accounting researchers to study how narcissism and other individual differences change employees' reactions to control systems. This research helps answer that call.

I test the hypotheses using an experiment on Amazon's Mechanical Turk (AMT). AMT is an online human intelligence task (HIT) platform where internet users (M'turkers) can log on and complete HITs for money. I manipulate wage level and pay transparency between subjects. Participants complete the first section, a translation task, at least a week before they complete the second section, a personality survey. In the first section, M'turkers translate pictures of letters into typed letters for two minutes and then learn (or do not learn) that other participants are being paid a different wage for the same task. After this, they are asked to translate letters again. After completing these tasks, the M'turkers are asked whether they would like to participate in a second type of task to be done a week later. Participants who opt into the second section receive personality surveys by email. All participants complete the same surveys for equal wages. Retention rates are high, with 70 percent of participants completing both the translation task and the surveys.

I find that, after discovering they are paid less than their coworkers, narcissists display stronger negative reciprocity than nonnarcissists. After doing a median-split based on narcissism scores, I find that narcissists reduce their productivity approximately twice as much as nonnarcissists. I also find that, after discovering they are paid more than their coworkers, narcissists respond with less positive reciprocity. Nonnarcissists increase productivity by about 12 percent, while narcissists show no increase in productivity. Together, these findings indicate

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Donnellan et. al 2009). Twenge and Foster (2010) retort these papers by documenting that a change in the racial structure of the samples explains the differences in findings.

that the effect of pay transparency is more nuanced than suggested by the FWEH. These findings also help explain the conflicting results between research rooted in the FWEH and that rooted in the theory of reciprocity. Similar to the FWEH, reciprocity theory suggests that employees who learn they are paid less than others will reduce productivity. In contrast to the FWEH, reciprocity theory suggests that those who learn they are paid more than others will increase their productivity. This research shows that personality traits at least partially explain how employees will respond to wage dispersion and transparency.

These results also contribute to the more specific debate over narcissism and reciprocity, answering a call by Meier and Semmer (2012) to examine positive reciprocity in narcissistic populations. They show that narcissists who are annoyed at work are more likely to report a desire to be negatively reciprocal than nonnarcissists. I show that this desire translates into action and that narcissists are more likely than nonnarcissists to be negatively but not positively reciprocal. This research also builds on other work by controlling for other personality traits closely related to narcissism and showing that narcissism is the most important trait in predicting reciprocity.

Finding that narcissists are asymmetrically reciprocal contributes to another stream of research: studies examining reciprocity and the effect of individual differences. Cohn et al. (2014) identify two types of employee behavior, symmetrically reciprocal (responding with positive and negative reciprocity) and nonreciprocal (responding with neither positive nor negative reciprocity). The authors assert that this pattern shows employees are either reciprocal or not, implying that an individual's inclination toward reciprocity is a personality trait in and of itself. My research indicates that there are more than just two patterns of reciprocity and that

observing reciprocity in one direction does not necessarily mean employees will be reciprocal in the other.

In the next section, I provide background information about pay transparency and narcissism. In Section 3, I develop the hypotheses. I describe the experimental design in Section 4 and report the results in Section 5. In Section 6, I conclude with a discussion of the findings and avenues for future research.

2. Background

2.1 Historical Background on Pay Transparency

Pay transparency is conceptualized as a gradient (Colella et al. 2007). On one end of the gradient is full transparency, where employees have the complete information set about the salary of every employee in the company. On the other end is pay secrecy, where employees have no information about coworkers' salaries. In practice, there are institutions across the gradient. Government employees are commonly subject to pay transparency, not just internally but also to the public. Complete transparency is unusual in nongovernmental entities, but there are some examples like Whole Foods[3] and SumAll where near-complete pay transparency is practiced. Other companies, particularly those with a remote workforce whose members do not frequently gather in the same office, may have near complete pay secrecy.

The debate over pay secrecy has a long history in the United States. Forcing employees to stay silent about pay levels was made illegal in 1935 when the National Labor Relations Act passed (U.S.C., 1935). Illegal activities include terminating the employment of or otherwise

[3] Whole Foods was recently acquired by Amazon, which does not practice pay transparency. Amazon has not announced how Whole Foods' compensation strategy will change in light of its ownership. However, pay transparency is a difficult policy to reverse, as employees are unlikely to forget what they have learned about others' wages. In addition, wages are sticky. They rarely decrease, and often wage increases are a function of the previous period's wages meaning that historical wage information can still be informative.

punishing employees for sharing salary information with one another. In spite of the law, a 2011 survey found that more than half of U.S. employees work at companies where a formal policy is in place to prevent them from discussing pay with one another (Hegewisch et al. 2011). Beyond the law, there is a large cultural taboo in the United States around discussing salary information. "It's perceived to be the unmentionable. We're the most open society in the world except for this one topic," says Peter LaBlanc, Senior Vice President of Sibson Consulting/The Segal Company (Krattenmaker 2002). He made this comment during a broader discussion about how pay secrecy proliferates in part because employees do not seek coworkers' salary information from employers.

The debate over pay transparency has seen revived interest in recent years not because firms desire to become more transparent but because lawyers claim transparency can help end pay discrimination (Eisenberg 2011; Ramachandran 2012). President Obama signed several executive orders on the subject (Exec. Order No. 13665, 3 2014; Exec. Order No. 13738, 3 2016). In 2014, he signed an order creating stiffer penalties for federal contractors who are discovered to have punished employees for discussing pay. On the day he signed the action, he explained his motivation as follows: "Pay secrecy fosters discrimination, and we should not tolerate it—not in federal contracting or anywhere else" (Obama 2014). President Trump repealed Obama's 2016 executive order. Despite this reversal, Gail Greenfield, a principal at the human resources consulting firm Mercer, says: "The momentum is already there on pay transparency. You can't take that back" (McGregor 2017).

The federal government is not alone in writing laws to diminish pay secrecy. At least 11 states have created their own laws that diminish companies' abilities to impose pay secrecy (Li 2015). For example, the state of California passed a law requiring both public and private

companies to disclose pay levels and wages by demographics (California Legislature 2017). The trend of pay disclosure has also spread internationally. Starting in 2018, companies in the United Kingdom with more than 250 employees must report salaries and bonuses by gender (Mason 2016). None of these laws will lead to full transparency, but they show that regulation is forcing companies to be more transparent in their pay practices.

A second force toward pay transparency is self-reported wage data. The data is hosted on websites like Glassdoor, PayScale, and Salary.com. Website users can anonymously input their own pay information and search the database for pay data on specific companies, roles, and locations. These websites reflect a culture change where some employees, particularly Millennials, desire more transparent salary information (McGregor 2017). The anonymous nature of these websites eases the potential social costs of salary discussion for employees, allowing members to share wage knowledge without breaking taboos or risking punishment at work.

Despite this international trend, accounting researchers have not studied horizontal pay transparency in great depth. The effect of increased transparency on worker productivity is therefore unclear. Downes and Choi (2014) review pay dispersion literature, assuming transparency where employees are aware the dispersion exists, and find that so long as employees perceive the wage dispersion to be fair, there are no negative effects of it. Brown et al. (2017) show that fairness perceptions are also effected by measurement error in the performance system and that increasing measurement accuracy will increase productivity in employees. Others have studied pay transparency from a managerial viewpoint, showing that it changes the way managers subjectively evaluate employees (Bol 2011). Transparency can

reduce the centrality bias (compression of wages) if managers know they have accurate employee performance data (Bol et al. 2016).

Other studies have examined the effect of public disclosure of relative performance (but not wage) information on employee performance. These studies examine horizontal performance transparency, and, since wages are often a function of performance, the findings have implications for pay transparency research. While most pay transparency work shows a negative effect from publishing wage information, as the FWEH would predict, the relative performance information (RPI) literature finds some positive effects of publishing performance information. Tafkov (2012) finds that public RPI disclosure increases performance more than private disclosure.

Dark triad traits, which include narcissism, Machiavellianism, and psychopathy, have also been studied in the context of RPI (Paulhus and Williams 2002; Furnham et al. 2013). Wang (2017) finds that RPI has a different effect for those low and those high in dark triad traits. It leads to a decrease in net productivity for those low in these traits because the employees begin believing that sabotaging the productivity of others is common and expected of them. In contrast, RPI causes those high in the traits more productive by providing a stronger set of incentives. Hales et al. (2012) study narcissism specifically and find that RPI increases productivity for narcissists.

These findings differ from those of the current paper, which predicts that narcissists will be less productive than nonnarcissists under pay transparency. These differences exist because the constructs studied differ fundamentally. RPI is an information system that makes *performance* more transparent. Pay transparency makes *wages*, the value the company places on each employee, transparent. Performance and wage knowledge may elicit different reactions

from employees. Multi-period RPI is also within the control of employees to change. In theory, they can work harder and see their performance improve. However, wages are sticky, and changing them may be outside of individual employee's control. Together, these papers highlight a need for additional research that specifically examines how the effects of publishing performance information and publishing wage information differ.

2.2 Narcissism

Havelock Ellis (1898) named "a tendency for the sexual emotions to be lost and almost entirely absorbed in self-admiration," calling it *Narcissus-like*. Ellis is the first known researcher to use the Greek character Narcissus's name to describe a personality trait. Because Ellis was a less-known psychologist, his work was not immediately impactful. Freud assimilated narcissism into the mainstream psychology canon (Raskin and Terry 1988). His fascination with narcissism helped inspire his famous theories of the id, ego, and super ego. Freud's fame brought greater interest in narcissism but created several divergent lines of research on the personality construct. As a result, narcissism's definition can differ, depending on who is using the term, leading to construct creep and confusion even today (Kirzan and Herlache 2017).

Modern research in narcissism is widely believed to have its origins in the 1960s and '70s, beginning with Kohut's work, in which he claims that narcissists are defined by grandiosity, over ambition, and exhibitionism (Kohut 1966). The new wave of research in the 1970s lead to the trait's first inclusion in the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association 1980). This highly influential manual guides clinical practice and diagnoses. The association defined narcissism as a grandiose sense of self-importance or uniqueness; a preoccupation with fantasies of unlimited success, power, brilliance, beauty, of ideal love; exhibitionism; an inability to tolerate criticism

or defeat; entitlement or the expectation of special favors without assuming reciprocal responsibilities; interpersonal exploitiveness; relationships that alternate between extremes of over idealization and devaluation; and lack of empathy. This sweeping definition was meant to explain behaviors of clinical narcissists and allow doctors to diagnosis Narcissistic Personality Disorder.

In advance of the manual's release, Raskin and Hall (1979) developed the Narcissist Personality Inventory (NPI) as a self-reported measurement of narcissism. The scale was later shortened to NPI-40 to increase the speed of measurement (Raskin and Terry 1988). Their 40-question scale is still predominately used in narcissism research (Ackerman et al. 2011). It also has been shortened a second time into the NPI-16, which helps when time and participant attention is limited, that is, when other surveys are being given at the same time, which is common in personality research. There are, however, competing scales used to measure the trait, including the Pathological Narcissism Inventory and the Hypersensitive Narcissism Scale (Pincus et al 2009; Hendin and Cheek 1997).

The study of the NPI and what the critical elements of narcissism are have overlapped. Psychologists have proposed anywhere from two and seven factors for defining narcissism (Emmons 1984; Raskin and Terry 1988; Ackerman et al. 2011). Most recently, a three-factor model has come to prominence. Ackerman et al. (2011) perform similar factor analyses of the NPI-40 as the researchers before them, but they use a more modern and rigorous methodology. They find that narcissism is best explained with three-dimensions: leadership/authority, grandiose exhibitionism, and entitlement/exploitiveness. The authors strongly advocate for any study using the NPI to explore factor analysis of the trait as the subjects who score higher or lower on different factors may have similar total narcissism scores but behave very differently.

For example, the leadership/authority factor is considered the adaptive factor. It is associated with extraversion, social potency, and global self-esteem. In other words, these are the behaviors that cause narcissists to often be well liked and advance to higher levels of leadership within firms. The other two factors— grandiose exhibitionism and entitlement/exploitiveness are considered the maladaptive. They are associated with behaviors like entitlement-rage, antisocial tendencies, and devaluing of others and cause narcissists to behave in what are widely considered unethical or undesirable ways.

Further complicating how narcissism is defined in the literature, some researchers believe that there are two types: grandiose and vulnerable narcissism (Dickinson and Pincus 2003; Miller et al. 2011). Grandiose narcissism is defined as the bold approach-oriented manifestation and is associated with hubris and exhibitionism (Kirzan and Herlache 2017). Vulnerable narcissism is defined as avoidance-oriented manifestation, characterized by defensiveness and resentment. These two types were proposed to help researchers clarify the different ways narcissism causes behaviors and the contradiction in pro- and anti-social behavior seen in narcissists. The most recently proposed model of narcissism is the spectrum model, which describes narcissism as being defined as self-important entitlement with grandiose and vulnerable narcissism types being how the trait of entitlement manifests itself in outward behaviors (Kirzan and Herlache 2017). This model links much of the research into one large model of narcissism. The model is new and still controversial among personality researchers. More research is needed to confirm this description.

In addition to being a complex personality trait in and of itself, narcissism is also closely related to other personality traits. It is primarily associated with the so-called dark triad, a cluster of three anti-social traits: narcissism, psychopathy, and Machiavellianism, (Paulhus and

Williams 2002, Furnham et al. 2013). While the dark triad traits share a common antagonistic core of "callousness and manipulation," they are each unique (Jones and Figueredo 2013). People with these traits often behave differently. For example, psychopaths and narcissists are more impulsive, whereas Machiavellians are very controlled in their actions and focus more on long-term outcomes (Paulhus and Williams 2002). Narcissism is considered the least malevolent of the traits because it also some pro-social tendencies (Kowalski et al. 2016). Because of narcissism's "lighter side", it is somewhat surprising that narcissism, not the other two "darker" traits, drives negative behaviors in the workplace. Narcissism, defined by entitlement, may be most influential in a setting defined by financial gains and losses.

3. Hypotheses Development

Behavioral economists have also investigated the effects of pay transparency by attempting to model employees' productivity when it is present. Akerlof and Yellen (1990) merged predictions from psychology, economics, and "common sense" into the FWEH.[4] The model assumes that each employee judges her actual wage relative to her perception of a "fair wage." The term "fair wage" describes the wage level at which the employee believes that the firm and the employee are in a state of equilibrium, where both are giving and receiving equal benefits. The perceived equality of outputs and inputs causes the wage to be fair.

An employee will only accept an employment contract if the actual wage the firm is offering is greater than or equal to her fair wage level (Akerlof and Yellen 1990). She bases this

[4]Akerloff and Yellen draw on Adams' (1963) theory of equity and Blau-Homans' (1955, 1974) theory of social exchange to form their predictions. As a result, each of these individual theories would have similar predictions to the ones from the FWEH. This research uses the FWEH to motivate the hypotheses because it concisely explains how these theories relate to each other and to pay transparency. In addition, the FWEH is a widely known and used model in the economics literature. While it would be possible to motivate the hypotheses using only one of these two theories, it would ignore the other literatures, and thus be less complete.

judgment of fairness on a combination of public information, such as the legal minimum wage, and private information, such as her knowledge of her own skill level. Gächter and Thöni (2010) assert that, when pay transparency is present, the employee adds horizontal wage comparisons to her information set and weighs these comparisons heavily in the fair wage calculation. While the employee calculates a fair wage before accepting the contract, fair wage levels are malleable, and, as the information set changes, so does the calculation of fair wage. When the employee's fair wage level changes, she compares her actual wages to her new fair wage level and makes a productivity decision for the subsequent work period.

The FWEH has two main predictions: one relates to an employee who is underpaid, relative to the fair wage, and another relates to an employee who is overpaid, relative to the fair wage. The first prediction is that an employee who discovers she is underpaid will be angry and will reduce her productivity level until it corresponds to what she believes is fair for the actual wage level—that is, she will engage in negative reciprocity. Reducing productivity restores the perceived equilibrium between her and the firm. The second prediction from the FWEH is that an employee who is relatively overpaid will *not* engage in positive reciprocity and increase productivity. Instead, she will justify to herself that the wage is fair. She will reason that she is uniquely skilled or that her job is more difficult than her coworkers' jobs. For those reasons, she will see her wage as fair. In keeping with these two predictions from the FWEH, I make two formal predictions, as follows:

H1a: The effect of pay transparency on the productivity of employees who are paid less than their coworkers is negative.

H1b: The effect of pay transparency on the productivity of employees who are paid more than their coworkers is not positive.

Each of these hypotheses predicts a simple effect of pay transparency, but together they form an interaction. I predict that the effect of pay transparency will differ depending on whether an employee is paid more or less than her coworkers. Several studies have used experimental evidence to confirm that, in the presence of pay transparency, these two predictions from the FWEH accurately describe employees' productivity on average (Gächter and Thöni 2010; Charness 2004; Cohn et al. 2014).[5] I formally predict these first two hypotheses to demonstrate that this experiment creates the appropriate environment to test the next two hypotheses. The behavior predicted by H1a and H1b serves as an economic baseline. This paper's main contribution will be to demonstrate how narcissism can predict deviations from that baseline.

In their study confirming that the FWEH predicts average behavior, Gächter and Thöni (2010) also show that focusing on this average effect ignores that the individual productivity choices are heterogeneous. Not all employees who are paid less than their coworkers reduce productivity. Similarly, not all employees who are paid more keep productivity levels constant. The authors classify the behavioral patterns they observe and name them based on colloquial terms for personality types. The names are not rooted in psychological theory. I merge Gächter and Thöni's (2010) observations and the personality literature to identify a personality trait associated with these patterns. By identifying a measureable trait, I can predict employee behavior, instead of merely classifying it.

The first FWEH prediction is that employees who discover they are underpaid will engage in negative reciprocity and reduce productivity. Gächter and Thöni (2010) call people whose behavior is consistent with this prediction the "envious" employees. In their experiment,

[5] While H1b is a replication, it is not without controversy. The large literatures on reciprocity and gift exchange would predict that those who discover they are paid more than others will in fact respond by increasing production (Gouldner 1960; Akerlof 1984).

these employees make up 28 percent of the sample population. The actions of this subpopulation suppress average firm productivity and create the net negative effect of transparency. I predict employees in the "envious" subpopulation have higher levels of narcissism than those in the rest of the population. I make these predictions for two reasons. First, narcissists feel more entitled to rewards than nonnarcissists and are therefore more likely to calculate a higher fair wage level (Emmons 1984). Second, narcissists are more likely to take revenge when they feel slighted (Kohut 1972; Twenge and Campbell 2003).

Entitlement, defined as the belief that one should be given a greater share of rewards and recognition than others, is the defining feature of narcissism (Kirzan and Herlache 2017). This feature influences narcissists' relationships with their employers. Accounting researchers have studied narcissism in CEOs, for whom individual compensation data and personality traits are more transparent than for lower level employees. The research has found that narcissistic CEOs desire more rewards than nonnarcissistic CEOs and manipulate companies into providing them with higher compensation (O'Reilly et al. 2013). Narcissistic CEOs also create a higher wage inequality between themselves and other executives. Other research has found that narcissistic CEOs are less likely to reward the effort and accomplishments of others in the organization, choosing to take more credit for the entire team's performance (Resick et al. 2009). These studies are important to this research because they show how narcissists' entitlement to financial gains changes the way they behave within the firm.

I predict that narcissists' high levels of entitlement result in a higher fair wage level than those who are less narcissistic. Entitlement is enhanced in this context because narcissists perceive their own performance on tasks to be better than it is, likely resulting in a belief that their inputs to the firm are higher than they actually are (Ames and Kammrath 2004). If

narcissists believe they are more deserving of rewards than others and that they are more productive, then equilibrium wage levels between the firm and narcissists will be higher. Because narcissists have a higher fair wage level than nonnarcissists, when pay transparency is present, narcissists are more likely to believe that they are underpaid and to feel they are being underpaid by a larger amount.

Narcissists are also more likely to seek retribution for what they believe to be an unfair wage. They will see having wage levels lower than their coworkers as a threat to their dysregulated self-esteem. When their egos are threatened, they respond with anger (Kohut 1972; Twenge and Campbell 2003). Narcissists are more likely than nonnarcissists to take revenge for perceived slights (Penney and Spector 2002). In the workplace, this anger translates to a desire to engage in negative reciprocity (Meier and Semmer 2012). This leads to my next hypothesis:

H2a: The negative effect of pay transparency on the productivity of employees who are paid less than their coworkers is greater for narcissistic employees than for nonnarcissistic employees.

In contrast to the asymmetric effect predicted by the FWEH, economics research on reciprocity predicts a symmetric effect, where both overpaid and underpaid employees behave reciprocally (Falk and Fischbacher 2006). The theory of reciprocity suggests that employees who know they are paid more than their coworkers will be more productive than those who do not know this information. In the case of pay transparency, employees who discover they are being paid more than their fair wages may believe that this is an act of kindness from the firm to them. They would then see the higher wages as a gift and respond in kind (Akerlof 1982, 1984). However, narcissists may not see the higher wages as gifts but rather may see higher wages as

the wage to which they are entitled. Therefore, they are unlikely to increase their productivity. This leads to the following hypothesis:

H2b: The positive effect of pay transparency on the productivity of employees who are paid more than their coworkers is lower for narcissistic employees than for nonnarcissistic employees.

These predictions are presented graphically in Figure 1. While I predict an interaction with H1a and H1b, I do not predict an interaction with H2a and H2b. Graphically representing the hypotheses shows more clearly that, when pay transparency is present, I predict that the effect of narcissism on productivity is always negative. However, this negative direction has two different meanings, depending on pay level. For underpaid employees, narcissism *increases* the magnitude of negatively reciprocal actions. For overpaid employees, it *decreases* the magnitude of positively reciprocal actions.

4. Methods

I test the hypotheses with a 2x2 experiment on Amazon's Mechanical Turk web service (AMT). The experiment occurs in two parts: a letter translation task and a personality survey. During the translation section, I manipulate pay level as either *lower paid*, with a wage of $0.50, or *higher paid*, with a wage of $1.00. I also manipulate transparency as either *transparent*, where horizontal wage information is shared, or *secret*, where no information about other participants' wages is given. Pay level is manipulated between subjects. Pay transparency is manipulated both between and within subjects.

This experiment has several features intended to increase external generalizability. First, the subjects are completing the HIT during the course of their normal activities on AMT. They are paid for participating in the same accumulated paycheck as they are paid for the other

nonresearch-related tasks they complete. In addition, the task mimics a corporate task so that subjects bring their experiences and expectation of equal pay to the setting. All participants have completed at least 100 HITs before they can qualify to take this HIT. As a result, they should be well versed in how AMT HITs work and have generated some income from the website. Furthermore, I, the experimenter and HIT administrator, am conceptualized as their "boss," creating a salient principal-agent relationship with the participants in which they experience real wage inequality. These factors are somewhat unusual for a laboratory experiment and create a setting more characteristic of a field experiment than a laboratory experiment (Harrison and List 2004; Bloomfield et al. 2016).

The wage levels were selected because the typical standard of pay on AMT is \$0.10 per minute (Logan et al. 2017; Bentley 2017). Participants complete this study in an average of 7.24 minutes, so participants would normally expect to be paid approximately \$0.75 for this task. Those in the *higher paid* condition, with wages of \$1.00, were relatively overpaid by \$0.25, and those in the *lower paid* condition, with wages of \$0.50, were relatively underpaid by the same amount. The average pay for the task is therefore equal to the standard AMT wage.[6] However, participants see that that wage will be \$0.50 and accept the contract before beginning the task. Since participants accept the HIT at a known actual wage of \$0.50, even the lowest wage is higher than their pre-transparency fair wage. Otherwise they would not have selected into the contract.

The instructions tell participants they will be completing the same letter transcription task twice for two minutes each time. Translation tasks are extremely common on AMT. Many HITs on AMT are for machine learning. M'turkers translate street signs, handwriting, sounds, etc., into

[6] Both common ideas of what fair wage would be—average market wage and average employee wage—are equal in this task.

machine-readable data. In this experiment, participants see a graffiti picture of a letter and then transcribe it into a box (Figure 2). The instructions explain that participants have two minutes to transcribe as many letters as possible and that they will be paid the same flat wage, no matter how many letters they correctly translate. The instructions also show participants how to exit the task early if they are tired of translating letters. Finally, they complete a quiz verifying that they understand the task.

After translating for two minutes, participants take a break. During this break, they are (or are not) given new information about their wages. The pay level manipulation is implemented using the AMT bonus feature. Participants in the *higher paid* condition are told they will be receiving an extra $0.50 bonus, bringing their total pay to $1.00. In the *lower paid* condition, participants are not given any new information, since they already know their flat wage is $0.50. In the *secret* conditions, no information about other workers' wages is given. In the *transparent* condition, participants are told half of all participants get a $0.50 bonus and that the bonus has nothing to do with task performance. The bonus is purely the result of me, the HIT requestor and principal in this setting, selecting some agents but not others for a bonus.[7] Then the participants are told whether they were or were not awarded the bonus. For the exact disclosures, see Figure 3.

I choose to manipulate pay level with a "bonus" because AMT HITs require the disclosure of wage information before participants accept a task, but bonuses can be given after the task is complete and can be a surprise to participants. The "bonus" was created to cause wage inequality but not disclose it before participants selected into the task. Participants receive both the base pay and the bonus at the same time, immediately following the completion of the HIT.

[7] Bonuses are decided by random assignment, but the word "random" was never shown to participants.

Operationalizing the wage inequality as a "bonus," instead of as a traditional wage, allows for better random assignment in the AMT environment but biases against finding results. Prospect theory suggests that bonuses activate a gain frame of mind, instead of a loss frame. Losses cause more disutility to participants than the lack of a gain.

Because the higher pay level is manipulated in this way, I expect that participants who receive the unexpected bonus will increase productivity in the second translation task. While I do not formally hypothesize it, I expect to see a significant effect of pay level on productivity. Note that my prediction from H1b is not that, in this setting, there will be no reciprocity. My prediction is only that participants in the *transparent* condition who get bonuses will not be more reciprocal than participants who receive the bonuses in the secret condition. I predict that transparency will effect reciprocity in the *lower*, but not in the *higher*, paid condition.

After the pay disclosure, participants are then asked to translate for two more minutes. The study's primary dependent variable is the difference in the number of letters subjects correctly translate between the first and second periods. Quantity decreases will proxy for negative reciprocity and increases will proxy for positive reciprocity. After participants complete the task, they are asked whether they want to complete follow-up tasks. They are told that everyone who participates in the future tasks will make $1.50. All participants know there will be no wage inequality in future sections. Only participants in the *transparent* condition who opted in were sent the follow up surveys. Participants were sent the surveys a week later to avoid any concerns that the task environment may affect their answers to personality questions[8] (Jonason and Webster 2010). The retention rate was high, with 70% of qualified participants

[8] Narcissism is a stable personality trait in adults, meaning it is not brought on by any stimulus and the level does not regularly change. There are arguments that the level changes throughout the course of someone's life, but those should not apply to the short time frame of this study. However, I still take the precaution of sending the surveys at least a week after the task.

completing all three sections of the task.

For the main hypothesis tests, I measure narcissism using the Narcissistic Personality Inventory (NPI-16) (Ames et al. 2006). To ensure that narcissism is driving the behavior of interest, I test for several other related traits. I measure the other two dark personalities from the dark triad, using the MACH-IV Machiavellian assessment and Levenson Self-Reported Psychopathy Scale (LSRP) (Christie and Geis 1970; Levenson et al. 1995). The Short Dark Triad (SD3) evaluates "darkness," the common core personality trait in the dark triad (Jones and Paulhus 2014; Jones and Figueredo 2013). I measure these to determine whether results are driven by darkness in general or by something particular about narcissism. The first survey also includes questions related to demographics, self-esteem, AMT usage, and employment history (Robins et al. 2001).

After participants complete the first survey, they are sent a link to a second survey, which also pays $1.50. This survey includes an equity sensitivity measure (EPR) and a second psychopathy scale (PPI-40) (King and Miles 1994; Lilienfeld and Andrews 1996). It also includes two types of narcissism scales: the Hypersensitive Narcissism Scale and the Narcissistic Grandiosity Scale (HSNS and NGS) (Hendin and Cheek 1997; Rosenthal et al. 2011). Participants answer nearly 250 questions in total, and many of the questions are very similar. The surveys are separated into two sections of approximately 120 questions each to reduce answering fatigue and increase the quality of data collection. For a timeline of the task, see Figure 4.

5. Results

5.1 Main Analysis

Data collection began with the letter translation task. Three hundred and forty-three participants from AMT completed it, with more than twice as many participants in the

transparent cells as in the *secret* cells. The data from the *secret* cells serves as a control condition to test the baseline predictions, H1a and H1b, for the simple effects of transparency at each pay level. More power was needed in the *transparent* cells because the data from these cells is used in conjunction with the personality data in the main tests of H2a and H2b. Personality and accounting researchers using AMT suggest cell sizes of at least 80, due to the noise in individual difference variables and the data collection method (Bentley 2017). One hundred and twenty observations were collected because retention rates for a longitudinal study of this nature on AMT were unknown prior to conducting the study. See Table 1 for participant counts and distribution.

I test that the participants were successfully randomized using a two-way ANOVA. *First period productivity* (*FPP*), the number of letters correctly translated in the first translation period, is the dependent variable. Transparency and pay level are the independent variables. Because I manipulate pay transparency within- and between-subjects, all participants are subject to pay secrecy during the first translation period. Participants in the *transparent* condition only experience pay transparency during the second translation period. Due to this feature of the experiment, *FPP* serves as a baseline level of effort for all participants. Since *FPP* is a measure of productivity that occurs before any of the manipulations of transparency and pay level occur, there should be no significant effect of either of the independent variables. (See Table 2, Panel A for descriptive statistics.) The results from the ANOVA show that neither independent variable has a significant effect on *FPP* (Table 3, Panel A). Finding no significant difference here

indicates that experimental procedures successfully randomized participants into all four conditions.

H1a and H1b are based on the predictions from the FWEH. The first two hypotheses predict that the effect of pay transparency on employee productivity is negative when employees discover they are paid less than coworkers and not positive when employees discover they are paid more. Together, H1a and H1b predict an interaction. I test these hypotheses by examining the overall pattern of productivity differences across the experimental conditions. The purpose of this analysis is to ensure this task is an appropriate test of the theoretical constructs. I first must establish that the FWEH holds in the sample so that there is an economic baseline of average behavior. I will then show how narcissism predicts how individual employees will deviate from the average.

To test the hypotheses and measure how the manipulations changed participants' productivity between periods, I examine *difference*. This variable is created by subtracting *FPP* from *second period productivity* (*SPP*), which are the number of letters correctly translated in the first and second periods, respectively. (See Table 2 for descriptive statistics and Figure 5 for a graphical representation of the participants' productivity differences by condition and period.) A negative (positive) value for *difference* indicates that participants translated fewer (more) letters in the second period than the first and thus exhibit negative (positive) reciprocity. On average in the *lower-paid secret* condition, participants decrease 0.4 letters. However, in the *lower-paid transparent* condition, there is a decrease of 5.8 letters (Table 2). In the *higher-paid transparent* condition, the *difference* variable is positive, showing that participants increase productivity by

2.3 letters. In the *higher-paid secret* condition, they are somewhat more productive and increase by an average of 5.1 letters (Table 2).

I begin the formal tests by testing H1a and H1b. Together these hypotheses predict an ordinal interaction, such that pay transparency will have a different effect, depending on whether participants are over- or underpaid. A two-way ANOVA, using *difference* as the dependent measure and *transparency* and *pay level* as the independent constructs, confirms that this interaction is significant ($p < 0.01$) (Table 3, Panel B) (Guggenmos et al. 2016). Simple effects analysis (Table 3, Panel C) further indicates a significant effect of transparency in the *lower paid* condition (confirming H1a) ($p < 0.01$) but not in the *higher paid* condition (confirming H1b[9]) ($p = 0.19$). Notably, while consistent with the FWEH, these results do not support the predictions from reciprocity theory, which predicts that workers will increase productivity after learning they are paid more than others.

The results from the letter translation task provide assurance that this task, though different from the previous papers' tasks, creates an appropriate environment in which to test the theories. Because I have established an economic baseline, I move on to this research's main contribution: showing that personality variables can predict how employees will deviate from that baseline. Of the 343 original participants, only the 240 participants in the *transparent* cells were asked to return to complete the surveys[10] (Table 1, Panels B and C). The personality surveys were separated into two different surveys because of the quantity of questions asked. Eighty-seven percent of invited participants from the first task completed the first survey.

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[9] H1b is a null hypothesis, meaning it cannot be rejected. However, since the interaction is significant, it is clear that the overall results support the predictions.

[10] The planned analysis did not require any personality data associated with the *secret* cells. Because of this, I did not collect it for both cells. While I did collect the data in the *lower paid secret* condition, I do not use it for any analysis in this paper.

Seventy percent of participants also completed the second survey. These retention rates result in 169 participants distributed over the two transparent experimental conditions.

The wages for the survey HITs were set higher than the market rate on AMT to increase retention. Retention was of particular concern for participants who were in the *lower-paid transparent* condition, since they may have felt wronged and may not have wanted to continue with an unfair employer. I find that participants are not more likely to drop out if they were in the *lower paid* conditions (Table 4, Panel A). I test this using a logistical regression. The dependent variable is an indicator variable equal to 1 if the participant completed both surveys and 0 if not. The independent variable of interest is *low pay,* which is another indicator variable equal to 1 if the participant was in the *lower paid* condition and 0 if not. A second independent variable, *date of letter task*, controls for the length of time between the letter translation task and the email asking them to participate in future surveys. The results of this regression show that lower paid participants are slightly more likely to return than those in the *higher paid* condition ($p = 0.04$).

It is also critical to check that there were no selection effects, based on observable individual participant characteristics. To rule this out, I complete the same type of logistical regression as used to check for the effect of experimental condition. In Table 4, Panels B-D, *FPP* and *SPP* as well as *difference* are regressed on likelihood to have completed the surveys. None of these three variables significantly predict likelihood of completion. Their insignificance provides some assurance that completing the surveys is not related to the personality traits of being hard working or reciprocal. Though I cannot say that completion is random, it does appear to be unrelated to the variables of interest from the letter translation task.

The personality scores were collected at least a week later.[11] Participants take the NPI-16 to test for narcissism. The test contains sixteen items, with each item consisting of two statements. Participants must select the statement that better describes them. Scores range from zero to 16, with 16 corresponding to the highest level of narcissism. Narcissism scores were highly skewed towards zero within the experimental subject population. I log transform the narcissism variable to address the skewness (skewness = 0.97, kurtosis = 0.14, Shaprio-Wilk Statistic = 0.88, p = < 0.01, untabulated).

I now move on to testing the second set of hypotheses, H2a and H2b, which predict that narcissists will have a stronger reaction to finding out they are paid less than coworkers and a weaker reaction to finding out they are paid more. The pattern of results is first examined using a median split to show how narcissists and nonnarcissists behave. This descriptive analysis is conducted to help visualize the results more easily, not as a formal test of the hypotheses. Formal tests of the hypotheses do not use a median split; those tests use the continuous version of the narcissism variable.

The overall pattern of results supports H2a and H2b. In the *lower paid* condition, narcissists exhibit stronger negatively reciprocity, reducing their productivity by approximately 25% on average (from 34.5 letters to 25.8 letters), while nonnarcissists reduce productivity by approximately 13% on average (from 35.1 to 30.4). In the *higher paid* condition, narcissists exhibit no positive reciprocity and instead show a slight decrease in productivity (from 31.4 to 30.5), while nonnarcissists increase by approximately 12% (from 33.6 to 37.7). The graphical representations of productivity in the transparent conditions are shown in Figure 6.

[11] Participants were emailed not less than a week following their letter translation task. Some participants were emailed up to two months after their task. Retention rates for participants who were emailed weeks later are lower than those emailed only a week later. After participants were emailed the surveys they could take them whenever they desired.

The independent variables of interest for my main tests are *narcissism score* and *pay level*. *Narcissism* is a continuous variable between zero and 16 that has been logged because of its skewedness. Higher values indicate a higher level of narcissism. Table 5, Panel A presents descriptive statistics for *narcissism*. Panel B presents the descriptive statistics for personality traits by cell. *Narcissism* is not significantly different between the *higher paid* and *lower paid* cells ($p = 0.27$). *Pay level* is a binary indicator variable equal to 1 if the participant was in the *lower paid* condition and 0 if in the *higher paid* condition.

While the hypotheses only predict that narcissists and nonnarcissists will have a different magnitude of change in productivity after pay transparency, it is also interesting to see whether narcissism has a main effect on first period productivity. I test this in Panel A of Table 6. The population used for this ordinary least squares regression is the 169 participants who were in the *transparent* experimental conditions and completed all three sections of the research task. I conduct this test using *FPP* as the dependent variable. I do not find that *narcissism* or *low pay* are significant predictors of *FPP* ($p = 0.52$ and $p = 0.25$ respectively). This regression indicates that narcissists are not always less productive than nonnarcissists.

The primary analysis of H2a and H2b, shown in Table 6, uses ordinary least square regressions with type III standard errors. The population used for these regressions is the same 169 participants who were used in the test of *FPP*. The dependent variable is *difference*, and I expect that the coefficients on *narcissism score* and *pay level* will be negative. Panel B reports the results of the regression using the combined sample of lower and higher paid participants. The coefficients on *narcissism* and *pay level* are both negative and significant ($p = 0.02$ and $p < 0.01$, respectively). In Panels C and D, I split the sample, based on whether the participants are

higher or lower paid.[12] I find that narcissism is still negative and significant in both the *higher paid* and *lower paid* samples, though it is only marginally significant in the *lower paid* condition ($p < 0.05$ and $p = 0.08$). These results combined support both of the hypotheses.[13]

5.2 Analysis of Narcissism Factors and Types

5.2.1 Ackerman et al.'s Three-Factor Model

Ackerman et al. (2011) assert that using the total NPI score alone is too blunt of a measure to understand the nuanced behavior of narcissists. Because of the wide spectrum of behaviors measured by the NPI-40, they perform a factor analysis of the scale and fit a three-factor model of narcissism. Together, the factors leadership/authority, grandiose exhibitionism, and exploitation/entitlement explain the wide variety of behaviors measured by the NPI scale. The subscales by themselves explain more specific elements of the traits. After performing this analysis, Ackerman et al. determine that future research on narcissism should be conducted not only using the total score but also using the individual factors of narcissism to determine which elements of the trait are driving behavior.

Each question on the NPI is designed to measure different behaviors found in narcissism. While there are different forms of the NPI that vary in length, all the NPI's draw from the same pool of questions. The questions are forced choices. Participants must choose the statement that best describes their personality. They choose between a narcissistic and nonnarcissistic

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[12] A regression combining the sample and including an interaction term for narcissism and pay level is not the ideal way of running this test because narcissism scores are frequently zero in the sample. The common occurrence of both 0 and 1 makes the interaction term, narcissism, and the dummy variable for pay level become extremely collinear. For full transparency, I have run this regression, and it does not support the hypotheses for the *lower paid* condition, only for the *higher paid* condition.

[13] These tests have similar results when using the raw, unlogged, narcissism score. For the full sample test, the raw score is still significant ($p = 0.03$). However, for the higher and lower paid split sample tests, narcissism is only marginally significant ($p = 0.07$ and $p = 0.09$). These tests are untabulated.

statement. Ackerman et al. categorize the statements according to their three factors of narcissism.

The first factor, leadership/authority, is characterized by leadership ability, social potency, and dominance. An example of a statement selection that would increase a participant's leadership/authority factor score is, "I am an extraordinary person." The second factor, grandiose exhibitionism, describes the self-absorption, vanity, superiority, and exhibitionistic tendencies seen in narcissists. An example statement choice from the NPI that demonstrates these behaviors is, "I really like to be the center of attention." The third factor, entitlement/exploitation, captures entitled beliefs and behaviors. It is characterized by a willingness to take advantage of others. An example statement choice emblematic of this factor is, "I insist upon getting the respect that is due me." For a complete list of all the narcissistic statements on the NPI-16 and how they correspond to each factor, see Appendix A.

My formal hypotheses of H2a and H2b predict that the overall effect of narcissism on reciprocity will be negative. I do not formally hypothesize the effect of each factor. However, the theory behind my negative directional hypotheses rests primarily on the behavior explained by the entitlement/exploitation factor. I predict that narcissists will be more negatively but less positively reciprocal because they believe they are entitled to a higher wage. Since entitlement is the primary driver of these behaviors, I expect that this factor will be significantly negatively related to *difference*. I do not make directional predictions for the other two factors. It is not clear how leadership/authority and grandiose exhibitionism will influence reciprocal behavior.

The leadership/authority factor captures some pro-social tendencies and is the adaptive facet of narcissism. It is negatively related to counterproductive workplace behaviors (Grijalva

and Newman 2015). Because of these findings, the factor may explain positively reciprocal behavior. However, when participants who score highly on this factor learn they are paid less than others, their desire to have higher social standing than their coworkers is violated. They may feel that their authority has been challenged and want revenge. The grandiose exhibitionism factor is linked to behaviors that, in my task, may relate to a desire to show the HIT requestor how many letters he or she can translate and to prove that he or she is the best at this task. This would indicate that participants scoring highly on this factor would translate more letters than others. However, the factor is also linked to vanity, which may mean someone feels more embarrassed and angry when not being paid as much as others. Being angry may lead to stronger negative reciprocity. Because it is not clear from theory how leadership/authority and grandiose exhibitionism may lead participants to behave, the analysis of these factors should be viewed as exploratory.

I run similar tests as I do when I test H2a and H2b with the full NPI-16 score using simple multivariate ordinary least squared regressions using type III standard errors. This time, I replace *narcissism* with individual variables for each of the three factors. In Table 7, Panel A, I first run a full sample test examining the relationship between all three factors and *FPP*. Just as the NPI score does not predict *FPP*, its three factors do not either. In Panel B, I run a full sample test examining the effect of *pay level* and the three factors on *difference*. All three factors significantly explain difference ($p < 0.01$ for all three[14]). However, while leadership/authority and entitlement/exploitation work in the same negative direction as the full NPI-16 score, the grandiose exhibitionism factor works orthogonally. It predicts working harder in the second

[14] I conduct these tests using one-tailed p-values because I predict that the overall effect of narcissism will be negative. However, using two-tailed p-values would not change any of the conclusions or significance levels.

period. In Panels C and D, I run split sample tests. I find that the same results hold in the lower paid sample ($p < or = 0.01$ for all three) but not in the higher paid sample. Entitlement/exploitation has a negative coefficient, as expected. It approaches significance but does not reach conventional levels ($p = 0.13$).

These results highlight the importance of running factor analysis on narcissism data. Participants whose total NPI scores are similar can behave differently, depending on which factors they score the highest. These results also indicate that the entitlement/exploitation factor works in the direction that theory would predict. Finding that not only the narcissism score but also the expected factor behaves in accordance with my predictions gives more support to the theoretical bases on which I make my primary hypotheses. The results are weaker in the split sample sets. Though the low paid sample mimics the full sample, the results in the higher paid sample are not significant. While these tests have much lower power, the lack of significance causes concern that the lower paid sample is driving the full sample results. In the future, collecting more data will be key to examining the robustness of these results.

5.2.2 Emmon's Four-Factor Model

While the work of Ackerman et al. is considered the most sophisticated, the NPI-16 was designed to measure each of Emmon's four factors of narcissism (1987). Each factor is captured by one fourth of the scale, meaning that the factors should be equally weighted in the total score. While this model is not currently considered the most rigorous, it is still of interest to examine the results because of its relationship with the construction of the scale. In Table 8, Panel A, I run a full sample test using each of the four factors: leadership/authority, self-absorption/self-admiration, superiority/arrogance, exploitiveness/entitlement. For brevity, I will not discuss each of these factors in the same detail as given for Ackerman et al.'s model. The names of these traits

indicate which types of behaviors the factor scores measure. (See Appendix A for a complete list of which statements relate to which factors.) Note that the composition of these factor scores are quite different from the scores in three-factor model even between factors that share the same names.

I find that only self-absorption/self-admiration loads significantly ($p = 0.08$). Exploitiveness/entitlement is the factor most central to my theory. I predicted a negative and significant effect, but it is not significant at conventional levels ($p = 0.13$). In untabulated results, I find that both self-absorption/self-admiration and exploitiveness/entitlement are significant in the highly paid sample. However, none of the factors are significant in the low paid sample. These results are surprising and difficult to interpret, particularly in light of the results from the three-factor model. I report them here for full transparency and to speak to the larger debate over which model best represents narcissism.

5.2.3 Raskin and Terry's Seven-Factor Model

This seven-factor model brings more specificity to Emmons' four factors. The six factors measured by the NPI-16 include authoritativeness, entitlement, exhibitionism, exploitiveness, self-sufficiency, and superiority. The NPI-16 is a shorter version of the NPI-40 and does not measure for the seventh factor, vanity. Because the scale does not measure all seven, the NPI-16 is not the correct one to conduct in this analysis. I conduct these tests because this factor model is the only one to have appeared previously in accounting research. Ham et al. (2017) use a longer scale, so their tests are more appropriate. I report my results to speak to this stream of literature and to be transparent.

In Table 8, Panel B, I find that authoritativeness ($p < 0.05$) and exploitiveness ($p < 0.01$) significantly explain a negative effect on *difference.* Exhibitionism explains a positive effect on

difference ($p < 0.01$). It is worrisome that entitlement is not a significant predictor ($p = 0.42$). In untabulated split sample tests, I find these results hold in the low paid sample but not the higher paid sample. It is difficult to rectify why these three factorization models find strikingly different results in my sample. Particularly, it is difficult to explain why the results differ dramatically between the high and low paid split samples.

Methodical issues, particularly sample sizes, may explain the mixed results. The population sizes used in this work are much lower than the sizes that would be typically used in the psychology literature. The sample sizes are even lower in the split sample tests. However, these mixed results would not be surprising to psychologists, since many articles have been written arguing how greatly the results differ between the models and the benefits of each approach. See Ackerman et al. (2011) for a comprehensive review of these factorizations and their development.

5.2.4 Vulnerable and Grandiose Narcissism

The other two major distinctions surrounding narcissism address the vulnerable and grandiose types. These two types name the two different ways that narcissism can be expressed through behaviors. The NPI measures both types of narcissism but is a more sensitive test of grandiose than vulnerable narcissism. In order to use more specific scales and have a better test of the trait, participants also complete two other narcissism scales. The Hyper Sensitive Narcissism Scale (HSNS) measures vulnerable narcissism (Hendin and Cheek 1997). The Narcissist Grandiosity Scale (NGS) measures grandiose narcissism (Rosenthal et al. 2011). In Table 9, Panel A, I run the full sample test from H2a and H2b, but, instead of using NPI score, I use HSNS score. In Panel B, I run this test using the NGS score. I find that the HSNS score does not significantly explain behavior ($p = 0.15$). NGS score is marginally significant and negative (p

= 0.09). These results indicate that the more widely known grandiose type of narcissism has a stronger association with the behavior shown in this study.

5.3 Robustness Checks

Because narcissism is closely associated with other personality constructs, I choose to measure several other traits to help ensure that narcissism is driving the results. Narcissism is a dysregulation of self-esteem. While the trait is associated with high self-esteem, high self-esteem alone does not capture the same construct as narcissism (Bosson et al. 2008). There may be many reasons to have high self-esteem, such as high skill levels and experience at a task. Narcissism is associated with a self-esteem level higher than what should be expected given other valid reasons. I measure self-esteem using a single question scale that has been commonly used in psychology literature (Robins et al. 2001). This measure is significantly correlated with narcissism, as would be expected (Table 4, Panel B). In Table 10, Panel A, I run the same full sample regression as in the test of hypotheses but this time control for self-esteem. Narcissism is still negative and significant. Self-esteem does not significantly explain the behavior. This finding indicates that narcissism (and all four factors that comprise it, not just inflated self-esteem) leads to a belief that someone deserves more compensation than others and drives the results.

I also test for the trait of equity preference. Entitlement is one end of the equity preference spectrum, which ranges from benevolent to entitled (Huseman et. al 1987). Benevolent persons believe others should retain all of the rewards, while entitled ones believe they themselves should retain all of the rewards. Narcissists are known for being entitled. As would be expected, I find that higher scores on the equity preference scale, indicating a higher level of entitlement, are significantly correlated with higher narcissism scores (Table 5, Panel B).

In Table 10, Panel B, I run the same regression as in my main tests of hypotheses and control for equity preference. Equity preference is a marginally significant predictor of reciprocal behavior. Much of the theory behind the hypotheses predicts that narcissism will moderate the strength of reciprocity because of entitlement, so equity preference is expected to be significant. However, it is important to see whether narcissism has incremental explanatory power beyond equity preference. The effect of narcissism is still significant in this regression. These results indicate that not only equity preference but also the collection of other behaviors that comprise narcissism, like having a strong desire for revenge, help explain reciprocal behavior. These results also help support the three-factor model's results indicating not only the entitlement factor, but also the other two factors, have significant explanatory power.

The last set of robustness checks ensures the effect is unique to narcissism and would not occur in all three dark traits. Narcissism is one-third of the dark triad (Paulhus and Williams 2002). This triad shares a core trait of callous manipulation, meaning that people who are high in "darkness" manipulate situations to fit their desired outcomes, even if they hurt others in the process. The dark triad construct has been used in accounting studies (Wang 2017). I measure darkness using the Short Dark Triad Measure (Jones and Paulhus 2014). In Table 10, Panel C, I find that the dark triad variable is not significant in the presence of the narcissism variable. This indicates that it is not darkness driving reciprocal behavior but rather some unique quality of narcissism.

In Table 10, Panel D, I run a stronger test of the other dark triad traits. I use more sensitive measures of psychopathy and Machiavellianism to ensure that narcissism is the most significant predictor of reciprocal behavior (Christie and Geis 1970; Levenson et al. 1995). I find that, when all three traits are combined into the same regression, only narcissism is a significant

predictor of reciprocal behavior.[15] Together, this set of robustness tests indicates that narcissism has unique explanatory power for reciprocal behavior.

5.4 Clustering

Part of the motivation for this study is that narcissists are known to cluster in firms. Because of this, the effects of narcissism may be magnified or mitigated, depending on the setting. Other research has examined narcissistic career preferences and predicted where narcissists would cluster. For example, Kowalski et al. (2017) show that narcissists are attracted to artistic, social, and business-related jobs. Since AMT is a real company with employees who are participating in the study, the average level of narcissism that has clustered in the population is of interest. AMT workers self-select into working in a remote office environment, with little opportunity for recognition and notoriously low pay. Researchers would predict that narcissism would be lower in this type of workforce (Kowalski et al. 2017).

The scale this research uses to measure narcissism, the NPI-16, is meant to measure normal distributions of narcissism in nonclinical populations (Raskin and Terry 1988). Given the design of the scale, one would expect scores to be normally distributed. The narcissism scores from the AMT population are highly skewed toward the right, meaning the sample population is not representative of a random sample. (See Figure 7 for a histogram.) Interestingly, the data from this study provides some proof that different organizations do attract different personality types and that it is possible to make informed predictions about firm population type.

[15] These three traits are highly correlated and frequently occur together in individuals. When I run the other two traits alone (as if I were conducting the tests of H2a and H2b but instead looking at the other two traits), psychopathy is significant but Machiavellianism is not. Machiavellianism only significantly explains behavior for those being paid more than others. This analysis is untabulated.

6. Conclusion

I find that, as the FWEH predicts, on average, the effect of pay transparency is to decrease firm productivity. Employees who are paid less than coworkers engage in negative reciprocity. The FWEH and the theory of reciprocity imply conflicting predictions for how employees who are paid more than their coworkers will respond. I find that, on average, employees do not engage in positive reciprocity, which supports the FWEH prediction. However, I find that narcissism moderates the strength of the reciprocal response. Narcissists engage in stronger negative reciprocity but weaker positive reciprocity. Together these results indicate that, while the FWEH predicts only costs to pay transparency (from the employer's perspective), there are in fact costs and benefits. The total effect of pay transparency on productivity depends on the level of narcissism in the employee population and the dispersion of wages.

These results speak to the reciprocity and individual differences literature. This study answers a call by Meier and Semmer (2012) to examine positive reciprocity in narcissists. I find that narcissists are less likely to be positively reciprocal than nonnarcissists. In addition, this study further documents causes of negative reciprocity in narcissists. Meier and Semmer (2012) show that narcissists will be less reciprocal when they feel undervalued at work. This study shows directly that, when pay transparency reveals narcissists are paid less than others, they will engage in negative reciprocity. This study also controls for other personality traits showing that narcissism, not self-esteem, equity sensitivity, or dark triad traits, explains the change in reciprocity. Since these traits are so highly correlated, it is important to examine which is driving the response.

This study's results contribute to another stream of reciprocity research as well. Cohn et al. (2014) identify only two types of individuals, those who are reciprocal and those who are not. They suggest that reciprocal individuals display positive and negative reciprocity symmetrically. However, I find that narcissists display asymmetric preferences for reciprocity, reacting with negative but not positive reciprocity.[16] In addition, like Gächter and Thöni (2010), Cohn et al. (2014) can only classify behavior. My use of personality traits allows reciprocal behavior to be predicted. Predicting is more useful because it allows managers to estimate how control systems will affect employee behavior.

There are limitations to this research design, related to the subject pool and the task design. For example, using AMT may provide a weaker test of the theory than an experiment using a traditional office population. Pay transparency and wage inequality may have a larger effect size in a traditional office setting because AMT workers cannot develop social relationships with coworkers and cannot observe their performance. In addition, in the current study, workers cannot actively sabotage the firm; they can only reduce their productivity to zero. In a traditional office setting, employees may be able to be truly counterproductive.[17] This design limitation works against finding support for the hypotheses because the most extreme examples

[16] Our results may differ because Cohn et al. (2014) may not have reported their results with enough granularity to show that in their data there were several types of behavior. They may have aggregated together anyone who showed any type of reciprocity. They say that they report only two types because positive and negative reciprocity were so highly correlated that they collapse them into the one condition.
[17] Counterproductive behavior observed in this experiment included sending lengthy angry emails to the experimenter, leaving strongly worded comments in the free response section of the task, posting negative reviews on AMT forums, and attempting to defraud the experimenter by emailing to wrongly claim he or she was selected to get a bonus but was never paid the bonus. While it is possible to observe these behaviors, it is not possible to quantify their effect on the "firm." These behaviors did, however, significantly lower the morale of the principal in this experiment by creating a more stressful research environment for her.

of negative reciprocity against the firm, sabotage and theft, cannot be captured by this design. This means that my results may understate the effects of negative reciprocity.

In future work, I plan to extend the findings from this paper and examine the intersection of pay transparency and performance-based pay. The use of a flat wage in this paper was a deliberate choice to simplify the setting, but future research should examine variable performance-based pay transparency. When variable pay is transparent, it is more closely related to RPI than a transparent fixed wage. Future research that examines how the effect of transparency differs when employees are given a flat wage versus a variable wage would help link the transparency and RPI literatures. While this research is interesting for all types of employees, specifically examining these variables in the context of narcissism would help explain the conflicting results between this study and the work of Hales et al. (2012) and Wang (2017), who find that public disclosure of RPI increases productivity for narcissists.

I would also like to examine the effect of public versus private transparency. In this paper, transparency is operationalized in a private way. While participants learned their wages relative to anonymous others, they did not know which participants were being paid more than or less than average or the employees' relative performance levels. In the same way, none of the participants' coworkers could identify them as being paid more or less than others. This private transparency differs from public transparency in important ways. Because the wages are anonymous in the study, low paid participants may primarily feel jealousy toward those paid more than them. If pay transparency was not anonymous, participants might feel a more salient sense of embarrassment because their coworkers would know their firm values them less than it values other employees.

These two issues, variable pay and publicly identifiable transparency, work together to form a larger one: if there is public pay transparency, based on individual performance, employees may behave differently than they do when wages are anonymous. Lower paid employees may not be willing to take negatively reciprocal actions that would make their performance suffer and thus embarrass them when their poor performance is revealed. Similarly, participants who are paid more than others, if publicly identified, may want to prove their worth to their coworkers and may respond by working harder, not because of reciprocity toward the firm but because of social concerns.

The intersection of personality and managerial control systems is a rich environment for future research. Firms and departments within firms have their own cultures. Since research shows that people cluster by personality traits and that people with different traits desire different types of jobs, accounting academics can help firms predict what the effect of different control systems might be based on the personalities of the employees. The efficacy of any management control system is affected by the culture of the company in which it is implemented.

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Figure 1: Predictions

The figure below graphically represents the hypotheses and the predictions from the FWEH as well as from the theory of reciprocity. On the horizontal axis is narcissism. On the vertical axis is change in productivity. The predictions for higher and lower pay are in the solid bold lines. The FWEH- and reciprocity-based predictions are in dashed lines. A positive increase in change represents positive reciprocity, while a negative change represents negative reciprocity.

Implementing pay inequality through a bonus causes a main effect of pay level in this setting. This main effect is shown in this figure but is not formally hypothesized, as it is not related to the underlying theory behind the predictions and is an artifact of how the task was implemented.

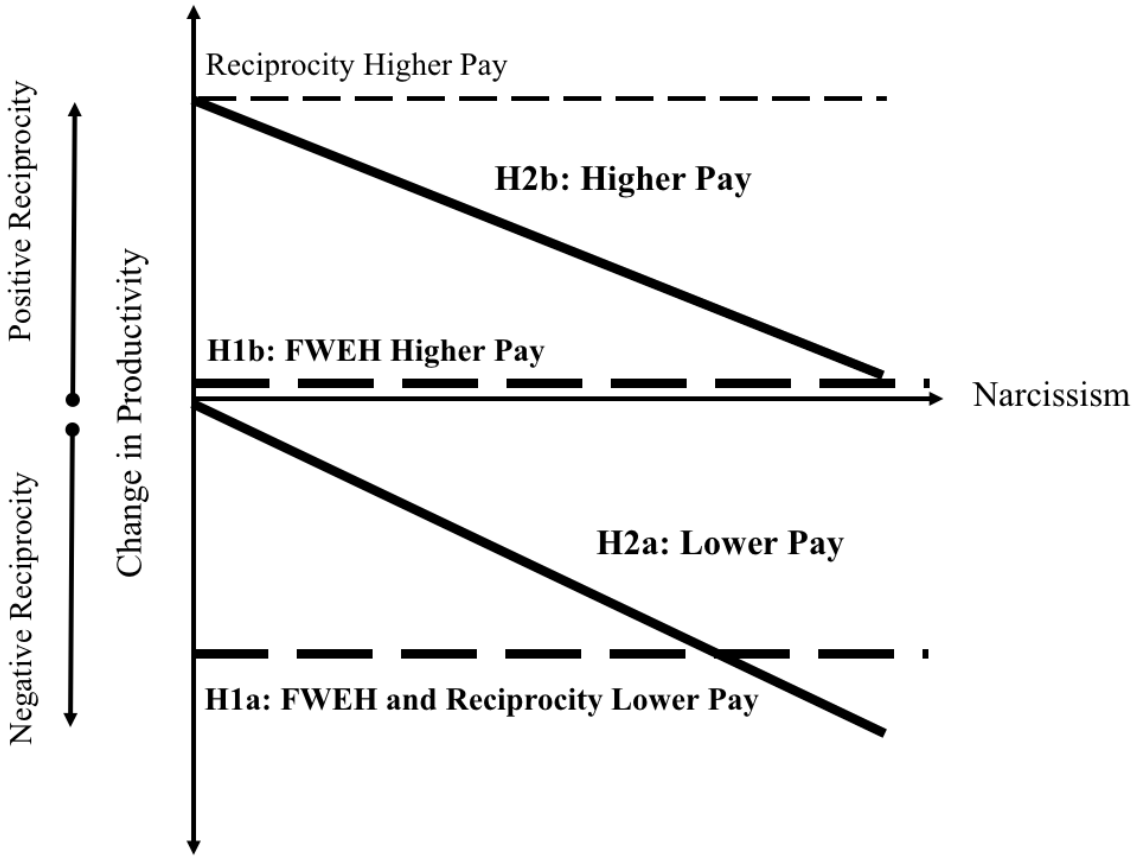


Figure 2: Task Example

The figure below depicts an example of the letter translation task. Participants look at a stylized picture of a letter and then type that letter. Participants are asked to complete this task two times for two minutes each. Between the tasks participants are given a break, during which they are given (or not given) the pay transparency information. Productivity is measured as the number of letters participants correctly translate in each section.

Figure 3: Experimental Manipulations

Listed below are the exact information disclosures given to participants. Participants see this information after the first translation task is complete but before they start the second translation task. They see the text as quoted, including emphasis.

Lower Paid Secret

No disclosure

Lower Paid Transparent

"I select half of the workers doing this task for another **$0.50 bonus** which means they get paid $1 total. This bonus has absolutely nothing to do with how many letters the workers translated. **I did not select you for the bonus."**

Higher Paid Secret

"You were selected for a $0.50 bonus and now will be paid $1.00 in total."

Higher Paid Transparent

"I select half of the workers doing this task for another **$0.50 bonus** which means they get paid $1 total. This bonus has absolutely nothing to do with how many letters the workers translated. **You were selected for the bonus and will be paid $1.00 in total."**

Figure 4: Experimental Timeline

The figure below depicts the timeline of the study. Participants first complete the letter translation task, where both wage level (*higher paid* or *lower paid*) and pay transparency (*transparent* or *secret*) are manipulated. At least a week after this task is completed, I invite participants in the *transparent* conditions to return and complete two personality surveys for additional compensation. The surveys are taken separately with at least 24 hours between them. Participants are compensated $1.50 for each survey they take.

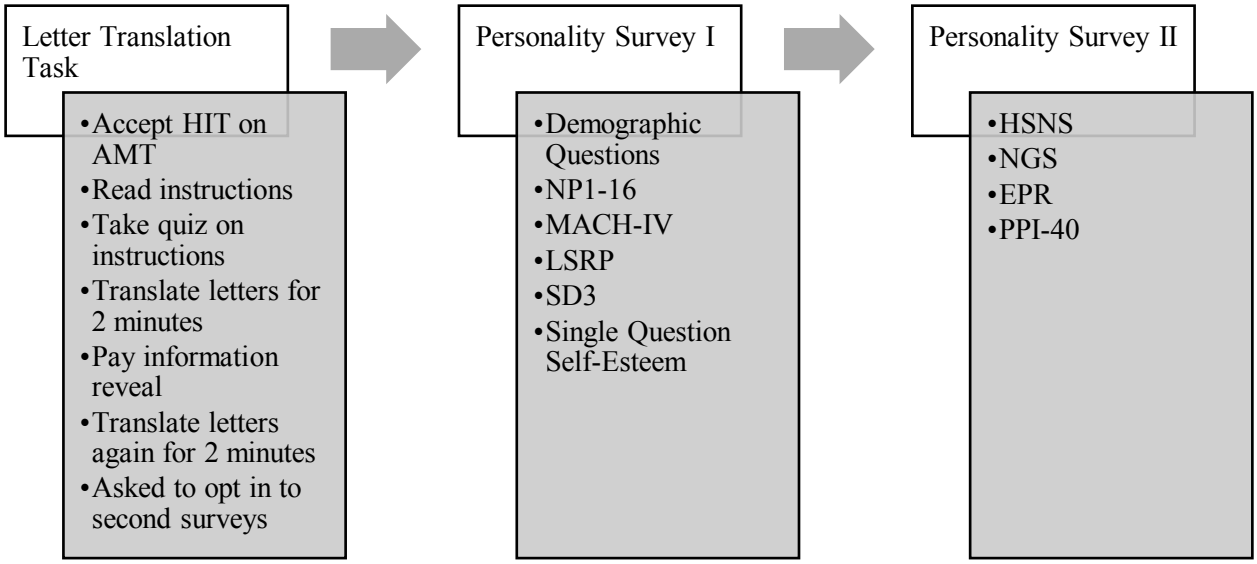
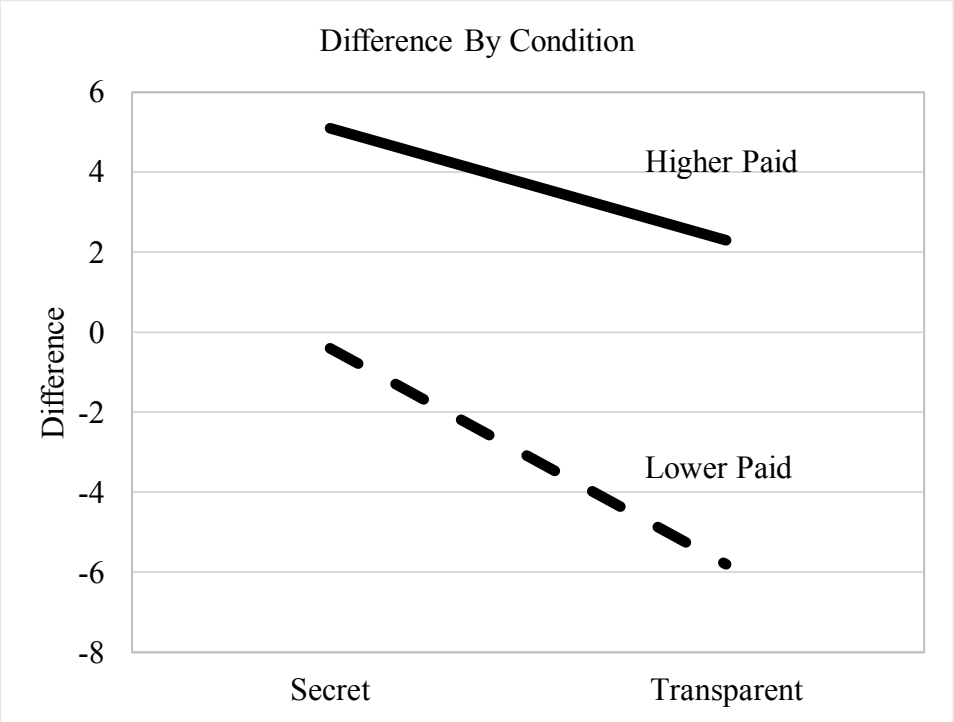
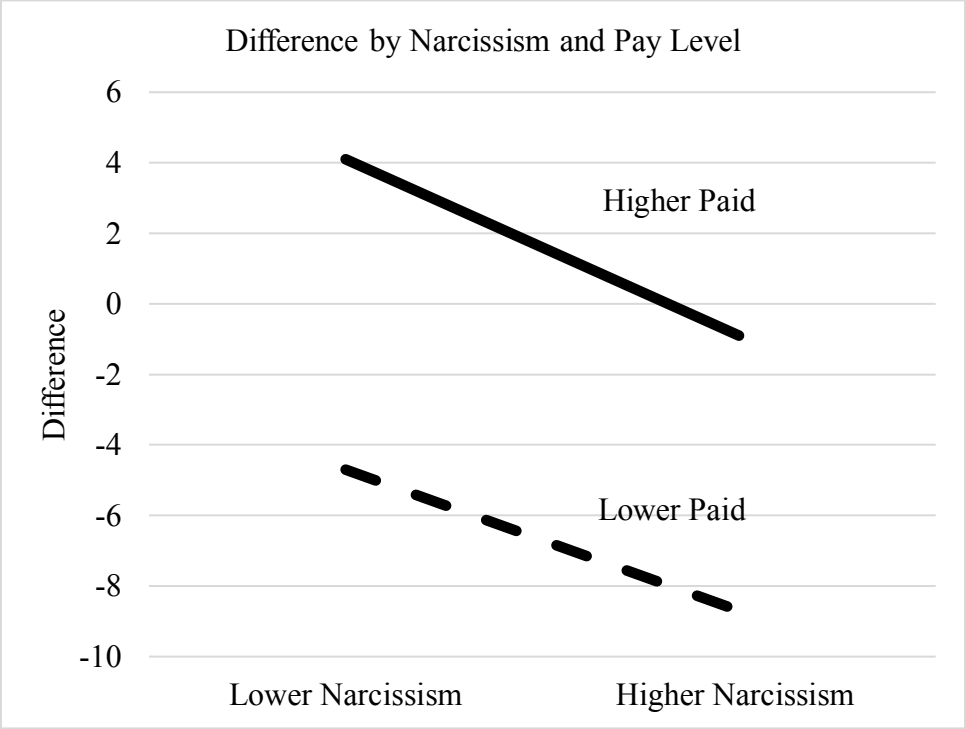


Figure 5: Difference by Condition



This graph represents the productivity decisions of the 343 participants who completed the letter translation task. On the vertical axis is the difference in letters correctly translated between periods one and two. On the horizontal axis are the *secret* and *transparent* conditions. The pay disclosures were shown to participants between the two periods. See Figure 2 for exact wording of the disclosures. Participants in the *lower paid* (*higher paid*) conditions were paid $0.50 ($1.00). Participants in the *secret* condition were not told about the wages of other participants. Participants in the *transparent* conditions knew that only 50% of participants were given the bonus. The slope of the *higher paid* line is not significantly different from zero. The slope on the *lower paid* line is significantly negatively sloped. See Table 3 Panel B and C for an ANOVA testing the overall pattern of results in this table. The results are consistent with the FWEH.

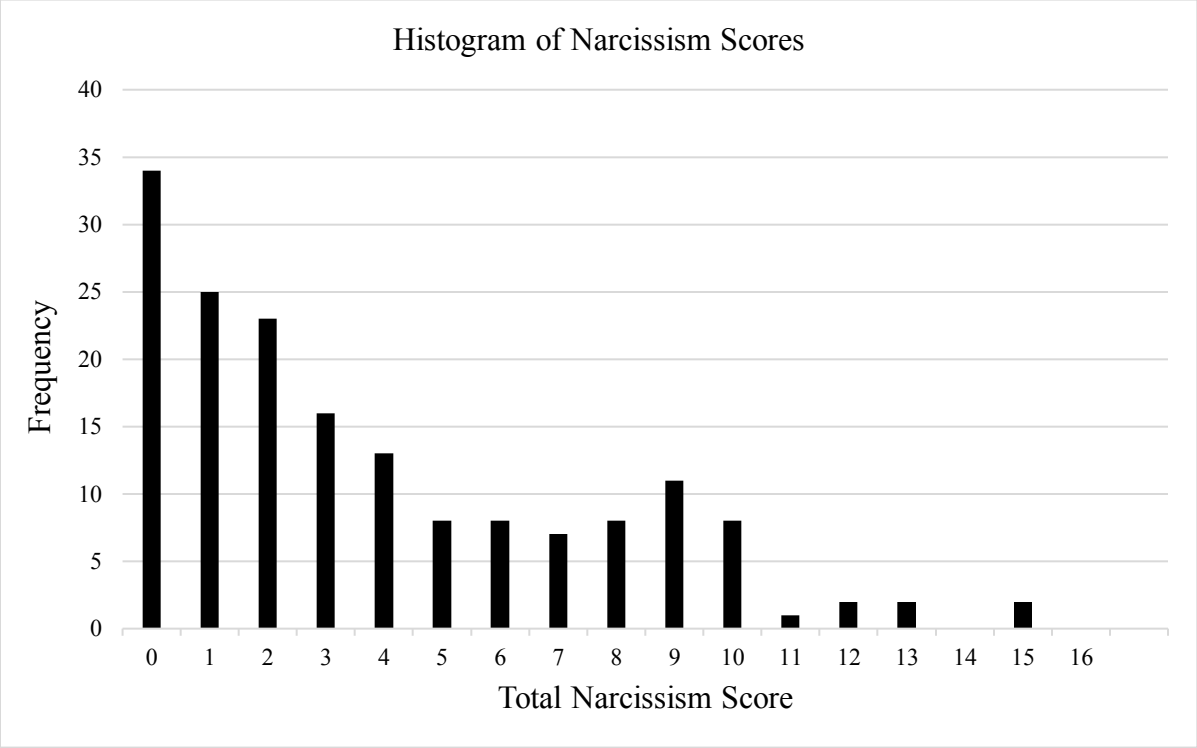
Figure 6: Difference by Narcissism and Pay Level



This graph represents the productivity decisions of the 169 participants who completed the letter translation task and were in the *transparent* condition. On the vertical axis is the number of letters correctly translated. On the horizontal axis are the first and second letter translation periods. The pay disclosures were shown to participants between the two periods. See Figure 3 for exact wording of the disclosures. Participants in the *lower paid* (*higher paid*) conditions were paid $0.50 ($1.00). Participants in the *transparent* conditions knew that only 50% of participants were given the bonus.

Participants were split into two groups *lower narcissism* and *higher narcissism*, based on whether their logged narcissism scores were higher or lower than the median score of 1.4. See Table 4 for complete descriptive statistics on personality variables. This graph visually supports the overall pattern of results predicted in H2a and H2b. See Table 5 for a statistical test of the hypotheses.

Figure 7: Histogram of Narcissism Scores



This figure is a histogram of the 169 participants in the *transparent* condition's narcissism scores. The scale is designed such that scores from a random sample would be expected to be normally distributed. The population is highly skewed towards zero (skewness = 0.97, kurtosis = 0.14, Shaprio-Wilk Statistic = 0.88, p = < 0.01).

Table 1: Participant Population

Panel A: Number of Participants who completed the Letter Translation Task [A]

	Lower Paid [B]	Higher Paid [C]	Row Totals
Secret [D]	N= 47	N= 56	N=103
Transparent [E]	N= 117	N= 123	N=240
Column Total	N= 164	N=179	N=343

Panel B: Number of Participants who completed the First Personality Survey

	Lower Paid	Higher Paid	Row Totals
Secret	N= N/A	N/A	N=N/A[F]
Transparent	N= 108	N= 100	N=208
Column Total	N= 108	N=100	N=208

Panel C: Number of Participants who completed the Second Personality Survey

	Lower Paid	Higher Paid	Row Totals
Secret	N= N/A	N/A	N=N/A
Transparent	N= 89	N= 80	N=169
Column Total	N= 89	N=80	N=169

[A] This data represents the number of AMT participants who successfully completed the letter translation task. Due to a programing error, some participants completed the task more than once. They were paid for each time they completed the letter task, but only the data from first time they completed the task is included in this analysis.
[B] Participants in the *lower paid* condition were paid $0.50.
[C] Participants in the *higher paid* condition were paid $1.00.
[D] Participants in the *secret* condition had no knowledge of other participants' wages.
[E] Participants in the *transparent* condition had knowledge of other participants' wages.
[F] Only participants in the *transparent* condition were invited to complete the surveys.

Table 2: Dependent Variable Descriptive Statistics: Variable Means (Standard Deviations)[A]

First Period Productivity (FPP)[1]		
	Lower Paid[B]	Higher Paid
Secret	34.1 (14.8) N=47[C]	33.0 (12.3) N=56
Transparent	33.3 (13.1) N=117	32.8 (12.4) N=123
Second Period Productivity (SPP)[2]		
	Lower Paid	Higher Paid
Secret	34.6 (21.1)	38.1 (16.5)
Transparent	27.5 (19.6)	35.1 (16.9)
Difference[3]		
	Lower Paid	Higher Paid
Secret	-0.4 (14.6)	5.1 (7.5)
Transparent	-5.8 (18.3)	2.3 (10.6)

[A] N = 343 participants who successfully completed the letter translation task.
[B] See Table 1 for definitions of experimental conditions.
[C] Cell sizes remain constant between each panel of this chart.

Variable Definitions:
[1] *FPP* = The number of letters correctly translated during the first translation task.
[2] *SPP* = The number of letters correctly translated during the second translation task.
[3] *Difference* = *SPP – FPP*.

Table 3: ANOVA. Test of H1a and H1b. The Effect of Transparency and Low Pay on FPP and Difference

Panel A: ANOVA. The Effect of Transparency and Low Pay on FPP[1]

Source of Variation	*SS*	*df*	*MS*	*F-statistic*	*p-value*
Transparent[2]	15.19	1	15.19	0.09	0.76
Pay Level[3]	40.50	1	40.50	0.24	0.63
Transparent x Pay Level	2.37	1	2.37	0.01	0.91
Error	57369.37	339	169.23		

Panel B: ANOVA. The Effect of Transparency and Low Pay on Difference[5]

Source of Variation	*SS*	*df*	*MS*	*F-statistic*	*p-value*
Transparent	1564.87	1	1564.87	8.80	<0.01***
Pay Level	4435.05	1	4435.05	24.95	<0.01***
Transparent x Pay Level	5484.86	1	5484.86	30.85	<0.01***
Error	60264.35	339	177.77		

Panel C: ANOVA. Simple Effects of Transparency for Each Pay Level

Source of Variation	*df*	*MS*	*F-statistic*	*p-value*
The Effect of Transparency on Lower Paid Participants	1	1324.24	7.45	<0.01***
The Effect of Transparency on Higher Paid Participants	1	308.34	1.73	0.19

Variable Definitions:
[1] *FPP* = The number of letters correctly translated during the first translation task.
[2] *Transparent* = An indicator variable where 1 = *Transparent* and 0 = *Secret*.
[3] *Pay Level* = An indicator variable where 1 = *Lower Paid* and 0 = *Higher Paid*.
[4] *Transparency x Pay Level* = *Transparent* * *Pay Level*.
[5] *Difference* = *SPP* – *FPP*. Where *SPP* = the number of letters correctly translated during the second translation task.

N = 343 participants who successfully completed the letter translation task.

All tests of *Narcissism* and *Pay Level* in Panels B and C use one-tailed tests because the direction of the effects are hypothesized. All others use two-tailed tests.

The full model eta-squared is 0.16. The eta-squared for the interaction term is 0.07.

*, **, and *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

Table 4: Retention Analysis [A]

Model Design:
$Likelihood\ of\ Retention = \beta_1 + \beta_2 Date\ of\ First\ Survey + \beta_3\ Variable\ of\ Interest + \epsilon$

Panel A: Test of Pay Level on Likelihood of Retention				
	Estimate	*SE*	χ^2	*p-value*
Intercept	-2.18	0.64	1.63	<0.01***
Date	0.47	0.25	4.08	0.06*
Pay Level	0.30	0.15	4.08	0.04**
Panel B: Test of First Period Productivity on Likelihood of Retention				
	Estimate	*SE*	χ^2	*p-value*
Intercept	-1.66	0.75	4.96	0.03*
Date	0.48	0.25	3.88	0.05**
FPP [B]	-0.01	0.01	1.83	0.17
Panel C: Test of Second Period Productivity on Likelihood of Retention				
	Estimate	*SE*	χ^2	*p-value*
Intercept	-2.11	0.66	10.18	<0.01***
Date	0.50	0.24	4.33	0.04**
SPP	-0.00	0.01	0.19	0.67
Panel D: Test of Difference on Likelihood of Retention				
	Estimate	*SE*	χ^2	*p-value*
Intercept	-2.19	0.63	12.20	<0.01***
Date	0.49	0.24	4.09	0.04**
Difference	0.00	0.01	0.38	0.53

[A] The logistical regressions represented in panels A-D were completed on the 240 who successfully completed the letter translation task, and were in the transparent condition.
[B] For variable definitions, see Table 2.

*, **, and *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

Table 5: Independent Variable Descriptive Statistics and Correlation Tables

Panel A: Descriptive Statistics

Parameter	*N*	*Min*	*Max*	*Median*	*Mean*	*SD*
Difference	169	-76	25	3.00	-2.42	16.65
Narcissism	169	0	2.77	1.39	1.26	0.84
HSNS	169	11	46	29.0	28.24	7.45
Equity Sensitivity	169	-32	30	-11.00	-11.07	13.16
Self-Esteem	169	1	7	5.00	4.57	1.79
Short Dark Triad	169	35	115	69.00	69.24	13.36
Machiavellianism	169	-25	54	-5.00	-5.50	8.75
Psychopathy	169	36	110	62.00	63.08	12.66
NGS	169	16	97	45.00	46.07	20.26

Panel B: Descriptive Statistics by Transparent Cells

Parameter	*Lower Paid*	*Higher Paid*	*T-stat*	*p-value*
Narcissism	1.19	1.33	-1.10	0.27
HSNS	29.15	27.24	1.67	0.10
Equity Sensitivity	-8.93	-13.46	2.26	0.03**
Self-Esteem	4.26	4.91	-2.40	0.02**
Short Dark Triad	68.26	70.34	-1.01	0.31
Machiavellianism	-4.48	-6.64	1.61	0.11
Psychopathy	63.43	62.68	0.39	0.70
NGS	43.94	48.45	-1.45	0.15

Panel C: Person Correlation Matrix

Parameter	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
Difference	1							
Narcissism	-0.13***	1						
HSNS	0.04	-0.06	1					
Equity Sensitivity	-0.20***	0.16**	0.51***	1				
Self-Esteem	-0.01	0.32***	-0.43***	-0.15*	1			
Short Dark Triad	-0.09	0.66***	0.27***	0.34***	0.04	1		
Machiavellianism	-0.07	0.19**	0.57***	0.51***	-0.34***	0.47***	1	
Psychopathy	-0.10	0.39***	0.42***	0.55***	-0.24***	0.74***	0.62***	1
NGS	-0.07	0.51***	-0.01	0.06	0.34***	0.49***	0.00	0.30***

Variable Definitions:
Difference = *SPP-FPP*, the change in productivity between periods 1 and 2
Narcissism = Score on the NPI-16
HSNS = Score on the Hypersensitive Narcissism Scale
Equity Sensitivity = Score on the Equity Preferences Rating
Self-Esteem = Score on the Single-Questions Self-Esteem Scale
Short Dark Triad = Score on the Short Dark Triad Scale
Machiavellianism = Score on the MACH-IV Machiavellianism Scale
Psychopathy = Score on the Levenson Self-Report Psychopathy Scale
NGS = Score on the Narcissistic Grandiosity Scale

Table 6: Tests of H2a and H2b [A]

Model Design:
$First\ Period\ Productivity = \beta_1 + \beta_2\ Narcissism + \beta_3\ Pay\ Level + \epsilon$

Panel A: Test of Narcissism and Low Pay on FPP [B]				
	Estimate	*SE*	*t-statistic*	*p-value*
Intercept	33.60	1.95	17.23	<0.01***
Narcissism Score [C]	-0.69	1.08	-0.64	0.52
Pay Level	2.08	1.81	1.15	0.25

Model Design:
$Difference = \beta_1 + \beta_2\ Narcissism + \beta_3\ Pay\ Level\ + \epsilon$

Panel B: Test of H2a and H2b Narcissism (Logged)				
	Estimate	*SE*	*t-statistic*	*p-value*
Intercept	6.06	2.66	2.28	0.02**
Narcissism Score [C]	-3.07	1.48	-2.08	0.02**
Pay Level	-8.78	-3.55	-3.55	<0.01***
Panel C: Test of H2a in Participants Who are Paid Less than Others				
	Estimate	*SE*	*t-statistic*	*p-value*
Intercept	-2.15	3.58	-0.60	0.54
Narcissism Score	-3.54	2.45	-1.44	0.08*
Panel D: Test of H2b in Participants Who are Paid More than Others				
	Estimate	*SE*	*t-statistic*	*p-value*
Intercept	5.31	2.30	2.31	0.02**
Narcissism Score	-2.50	1.47	-1.73	<0.05**

[A] The ordinary least squared regressions represented in panels A and B were completed on the 169 participants in both *transparent* conditions.
[B] For variable definitions, see Table 2.
[C] For personality variable definitions, see Table 5.
[D] The ordinary least squared regression represented in panel B was completed on the 89 participants the *lower paid transparent* conditions.
[E] The ordinary least squared regression represented in panel C was completed on the 80 participants in the *higher paid transparent* conditions.

All tests of *Narcissism* and *Pay Level* on *Difference* use one-tailed tests because the direction of the effects are hypothesized. All others use two-tailed tests. P-values are calculated using type III standard errors.

*, **, and *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

Table 7: Analysis of Ackerman et al.'s Narcissism Factors

Model Design:
$FPP = \beta_1 + \beta_{2-4}\, Factors + \beta_5 \epsilon$

Panel A: Ackerman et al.'s Three Factors of Narcissism in Full Sample [A,B]				
	Estimate	*SE*	*t-statistic*	*p-value*
Intercept	34.56	1.30	26.50	<0.01***
Leadership/Authority [C]	0.10	1.03	0.10	0.92
Grandiose Exhibitionism	-0.39	0.93	-0.42	0.67
Entitlement/Exploitiveness	-0.73	1.12	-0.64	0.52

Model Design:
$Difference = \beta_1 + \beta_{2-4}\, Factors + \beta_5\, Pay\ Level + \beta_6 \epsilon$

Panel B: Ackerman et al.'s Three Factors of Narcissism in Full Sample				
	Estimate	*SE*	*t-statistic*	*p-value*
Intercept	4.12	2.14	1.93	0.06
Leadership/Authority	-4.55	1.35	-3.37	<0.01***
Grandiose Exhibitionism	4.01	1.24	3.24	<0.01***
Entitlement/Exploitiveness	-3.11	1.49	3.24	<0.01***
Pay Level	-7.10	2.42	-2.93	<0.01***
Panel C: Ackerman et al.'s Three Factors of Narcissism in Low Paid Sample [D]				
	Estimate	*SE*	*t-statistic*	*p-value*
Intercept	-0.43	2.81	-0.15	0.87
Leadership/Authority	-8.09	2.05	-3.94	<0.01***
Grandiose Exhibitionism	7.22	1.95	3.70	<0.01***
Entitlement/Exploitiveness	-5.49	2.43	-2.26	0.01**
Panel D: Ackerman et al.'s Three Factors of Narcissism in Higher Paid Sample [E]				
	Estimate	*SE*	*t-statistic*	*p-value*
Intercept	2.71	1.74	1.56	0.12
Leadership/Authority	0.41	1.51	0.27	0.39
Grandiose Exhibitionism	-0.15	1.32	-0.11	0.45
Entitlement/Exploitiveness	-1.74	1.51	-1.16	0.13

[A] The ordinary least squared regressions represented in panels A and B were completed on the 169 participants in both *transparent* conditions.
[B] For variable definitions, see Table 2.
[C] For factor definitions and variable derivations see Appendix A
[D] The ordinary least squared regression represented in panel B was completed on the 89 participants the *lower paid transparent* conditions.
[E] The ordinary least squared regression represented in panel C was completed on the 80 participants in the *higher paid transparent* conditions.

All tests of the factors and *Pay Level* on *Difference* use one-tailed tests because the direction of the effect of narcissism is hypothesized. All others use two-tailed tests. P-values are calculated using type III standard errors.

*, **, and *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

Table 8: Analysis of Other Narcissism Factor Structures

Model Design:
$Difference = \beta_1 + \beta_{2-5}\, Factors + \beta_6 \epsilon$

Panel A: Emmons Four Factors of Narcissism in Full Sample [A]				
	Estimate	*SE*	*t-statistic*	*p-value*
Intercept	5.09	2.34	2.17	0.03**
Leadership/Authority [B]	1.04	1.17	0.89	0.19
Self-Absorption/Self-Admiration	-2.47	1.71	-1.44	0.08*
Superiority/Arrogance	-0.19	1.29	-0.15	0.44
Exploitiveness /Entitlement	-1.50	1.28	-1.17	0.13
Pay Level	-9.00	2.57	-3.51	<0.01***

Model Design:
$Difference = \beta_1 + \beta_{2-8}\, Factors + \beta_9 \epsilon$

Panel B: Raskin and Terry's Seven Factors of Narcissism in Full Sample				
	Estimate	*SE*	*t-statistic*	*p-value*
Intercept	5.22	2.38	2.19	0.03**
Authoritativeness	-3.50	2.08	-1.68	<0.05**
Entitlement	0.48	2.29	0.21	0.42
Exhibition	4.26	1.59	2.68	<0.01***
Exploitiveness	-3.86	1.32	-2.93	<0.01***
Self-Sufficiency	-0.18	2.263	-0.07	0.57
Superiority	-0.56	1.64	-.34	0.37
Pay Level	-7.90	2.48	-3.18	<0.01***

[A] The ordinary least squared regressions represented in panels A and B were completed on the 169 participants in both *transparent* conditions.
[B] For factor definitions and variable derivations see Appendix A

All tests of the factors and *Pay Level* use one-tailed tests because the direction of the effect of narcissism is hypothesized. All others use two-tailed tests. P-values are calculated using type III standard errors.

*, **, and *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

Table 9: Analysis of Narcissism Types

Model Design:
$Difference = \beta_1 + \beta_2\ Hyper\ Sensitive\ Narcissism + \beta_3\ Pay\ Level\ + \epsilon$

Panel A: Test of H2a and H2b using Hyper Sensitive Narcissism [A,B]				
	Estimate	*SE*	*t-statistic*	*p-value*
Intercept	-2.81	4.94	-0.57	0.57
Hyper Sensitive Narcissism Score [C]	0.18	0.17	1.04	0.15
Pay Level	-8.68	2.51	-3.46	<0.01***

Model Design:
$Difference = \beta_1 + \beta_2\ Grandiose\ Narcissism\ Score + \beta_3\ Pay\ Level\ + \epsilon$

Panel B: Test of H2a and H2b using Grandiose Narcissism				
	Estimate	*SE*	*t-statistic*	*p-value*
Intercept	5.91	3.50	1.69	0.09*
Grandious Narcissism Score	-08	0.06	-1.31	0.09*
Pay Level	-8.71	2.50	-3.48	<0.01***

[A] The ordinary least squared regressions represented in panels A and B were completed on the 169 participants in both *transparent* conditions.
[B] For variable definitions, see Table 2.
[C] For personality variable definitions, see Table 5.

All tests of the types of narcissism and *Pay Level* use one-tailed tests because the direction of the effect is hypothesized. All others use two-tailed tests. P-values are calculated using type III standard errors.

*, **, and *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

Table 10: Robustness Checks [A]

Model Design:

$$Difference = \beta_1 + \beta_2\ Narcissism + \beta_3\ Pay\ Level\ +\ \beta_{4-n} Control\ Variables + \epsilon$$

Panel A: Test of H2a and H2b Controlling for Self-Esteem Traits				
	Estimate	*SE*	*t-statistic*	*p-value*
Intercept	6.54	4.00	1.63	0.10
Narcissism Score	-3.00	1.56	-1.92	0.03**
Pay Level	-8.85	2.52	-3.52	<0.01***
Self-Esteem Score	-0.12	0.74	-0.16	0.87
Panel B: Test of H2a and H2b Controlling for Equity Preference				
	Estimate	*SE*	*t-statistic*	*p-value*
Intercept	3.08	3.11	0.99	0.32
Narcissism Score	-2.59	1.49	-1.74	0.04**
Pay Level	-7.92	2.50	-3.17	<0.01***
Equity Preference Score	-0.17	0.10	-1.81	0.07*
Panel C: Test of H2a and H2b Controlling for Darkness				
	Estimate	*SE*	*t-statistic*	*p-value*
Intercept	8.17	7.46	1.10	0.27
Narcissism Score	-2.68	1.97	-1.36	0.09*
Pay Level	-8.80	2.48	-3.55	<0.01***
Short Dark Triad Score	-0.04	0.12	-0.30	0.76
Panel D: Test of H2a and H2b Controlling for Dark Triad Personal Traits				
	Estimate	*SE*	*t-statistic*	*p-value*
Intercept	9.05	8.92	1.01	0.31
Narcissism Score	-2.80	1.62	-1.73	0.04**
Pay Level	-8.74	2.51	-3.48	<0.01***
Psychopathy Score	-0.05	0.13	-0.38	0.70
Machiavellianism Score	0.02	0.18	0.10	0.92

[A] All four ordinary least squared regressions represented in panels A–D were completed on the 169 participants in the *transparent* conditions.
[B] For variable definitions, see Table 2.
[C] For personality variable definitions, see Table 5.

All tests of *Narcissism* and *Pay Level* use one-tailed tests because the direction of the effects are hypothesized. All others use two-tailed tests. P-values are calculated using type III standard errors.

*, **, and *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

Appendix A: NPI-16 Questions and Factor Structure

Narcissistic Statement	Ackerman Factor	Emmons Factor	Raskin and Terry Factor
I really like to be the center of attention	Grandiose Exhibitionism	Leadership/ Authority	Exhibition
I am an extraordinary person	Leadership/ Authority	Self-Absorption/ Self-Admiration	Superiority
I always know what I am doing	Not Included in Analysis	Superiority/ Arrogance	Self-Sufficiency
I find it easy to manipulate people	Entitlement/ Exploitiveness	Exploitiveness /Entitlement	Exploitiveness
People always seem to recognize my authority	Leadership/ Authority	Leadership/ Authority	Authoritativeness
I know that I am good because everybody keeps telling me so	Grandiose Exhibitionism	Self-Absorption/ Self-Admiration	Superiority
I am apt to show off if I get the chance	Grandiose Exhibitionism	Superiority/ Arrogance	Exhibition
I am more capable than other people	Not Included in Analysis	Exploitiveness /Entitlement	Exploitiveness
I think I am a special person	Not Included in Analysis	Self-Absorption/ Self-Admiration	Superiority
Everybody likes to hear my stories	Not Included in Analysis	Superiority/ Arrogance	Exploitiveness
I insist upon getting the respect that is due me	Entitlement/ Exploitiveness	Exploitiveness /Entitlement	Entitlement
I like having authority over people	Leadership/ Authority	Leadership/ Authority	Authoritativeness
I am going to be a great person	Leadership/ Authority	Self-Absorption/ Self-Admiration	Exploitiveness
I can make anybody believe anything I want them to	Not Included in Analysis	Superiority/ Arrogance	Exploitiveness
I expect a great deal from other people	Entitlement/ Exploitiveness	Exploitiveness /Entitlement	Entitlement
I like to be the center of attention	Grandiose Exhibitionism	Leadership/ Authority	Exhibition