Certainty, Severity, and Low Latency Deception

by

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ABSTRACT

There has been an ongoing debate between the relative deterrent power of certainty and severity on deceptive and criminal activity, certainty being the likelihood of capture and severity being the magnitude of the potential punishment. This paper is a review of the current body of research regarding risk assessment and deception in games, specifically regarding certainty and severity. The topics of game theoretical foundations, balance, and design were covered, as were heuristics and individual differences in deceptive behavior. Using this background knowledge, this study implemented a methodology through which the risk assessments of certainty and severity can be compared behaviorally in a repeated conflict context. It was found that certainty had a significant effect on a person's likelihood to lie, while severity did not. Exploratory data was collected using the dark triad personality quiz, though it did not ultimately show a pattern.

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CHAPTER 1

INTRODUCTION

Criminal justice research has identified two key dimensions in crime deterrence: certainty, the likelihood a deceptive behavior will be detected, and severity, the size of the punishment incurred. The relative power of each of these dual risk factors has been the topic of debate among criminological research for quite some time, as it would be valuable to know where to focus efforts in preventing criminal behaviors. This paper explores these two factors of risk in the context of a game.

The research question, whether the likelihood of discovery or the penalty upon capture is greater at preventing deception, is most closely related to the areas of heuristic reasoning and game theory. Heuristic reasoning is the theory that humans use cognitive shortcuts to supplement decision making, which give more weight to certain options over others. An example of this would be the bias due to retrievability; when asked to judge the relative size of two sets of pictures, one picturing males and the other females; it was found that participants would erroneously recall the group with more famous people as the larger group (Kahneman and Tversky, 1974). If a bias exists towards certainty or severity exists when weighing benefits versus consequences, it may be due to some form of heuristic. Game theory provides a framework and a set of guiding practices for development.

Individual differences play a key component in deception, so an evaluation of these was pursued as exploratory data. The Short Dark Triad is a validated index of three antisocial personality traits known as Machiavellianism, Narcissism, and Psychopathy. Machiavellianism is the manipulative trait, Narcissism is characterized by elevated self-

image, while Psychopathy represents those high impulse and low empathy (Paulhus and

Williams, 2002). Of these, Machiavellianism and Psychopathy are of particular interest

given their relationship to deception.

CHAPTER 2

BACKGROUND

Certainty and Severity

According to classical deterrence theory three attributes must be present to deter behavior: the actor knows that the punishment exists, there is a high risk (real or perceived) of being caught, and the consequences upon being caught are of a high enough severity (Wikstrom, 2007). The effect certainty and severity have on illegal activity has been extensively studied within the criminal justice field, though the science is far from settled. A large body of empirical studies across the literature conclude that certainty has a greater weight than severity in deterring criminal acts (Witte, 1980; Grogger 1991), a small body that suggests that opposite relationship in some situations (Silberman 1976), and yet other studies that have found support for equal weighting (Mendes 2004).

Just as the conclusions drawn by different researchers differ, a grappling tension exists in the methodologies employed; cross sectional and longitudinal research each have their advocates. There are two main issues with cross sectional design, temporal order and unwanted influence on the dependent variable (Paternoster, 1987). The problem of temporal order is this: our perceptions and morality are altered by what we do. (Greenberg, 1981) This interferes with cross sectional design, as researchers assume that perceptual stability exists (Paternoster, 1987). Unwanted influence simply includes the many variables that may influence a person's perception of risk, social, moral, etc. In order to test the perceptual stability hypothesis, Paternoster took data previously collected twice from 300 college students with a year in between. Participants were asked for their certainty and severity of punishment for a variety of crimes, including their own personal

certainty of a hypothetical capture for each crime. He found that among petty theft, marijuana use, writing bad checks, and vandalism, over half had a new perception of risk at the second testing, aside from marijuana use which only 42% changed on. The study concludes that the deterrent effects are only significant for marijuana use, and only by a small amount. Those who committed petty theft, bad check writing, and vandalism between the two poling dates had significantly lower estimates of risk than those who did not commit crimes. Marijuana use was the standout with a larger proportion of raised risk perception. These results suggest to us that perceptions changes as a result of behavior and that different scenarios skew these perceptions in different ways.

In a similar vein to Paternoster's critique of cross-sectional design, Mendes is similarly unimpressed with aggregate level deterrence studies and empiricists (Mendes, 2004). Aggregate studies cover only the objective aspects of decision making and not individual level deterrence. However, these aggregate studies claim to support Becker's model of risk prone criminality (Becker, 1968). Her argument is that we should theoretically not expect a greater weight between certainty or severity. Further, Mendes (2004) suggests that criminals are actually risk neutral.

Jacobs and Piquero cover another complicating feature of certainty and severity, boundary crossing, the degree to which certainty and severity interfere or interact with each other. (2013). To do this they used drunk driving scenarios with high and low certainty and severity conditions, which participants would to respond to in a five-minute survey asking them for a probability that they would get caught and how much of a problem the punishment would be if they were caught. In the first analysis they found that almost all objective certainty and severity combinations had very little effect on

subjective certainty and severity. A second analysis using a model to predict drinking intentions found that certainty was a more consistently effective inhibitor than severity. Perceptual certainty acts as an inhibitor only in the low certainty/high severity condition, while perceptual severity does the same only in the low/low condition. The authors suggest that there is a "cognitive sleight of hand" wherein severity and certainty become muddled.

Active observable cheating was examined by Nagin and Pogarsky (2003) in the context of a quiz. The quiz was administered to university students after they had spent much of the 45-minute session on a filler packet of material. Participants were told they would be given a $10 reward for answering six questions correctly. The quiz was designed so this would not be possible by guessing. Before doing the quiz, participants were told that an answer sheet existed in their materials that they could look at after they had completed the quiz. Participants who passed the quiz were measured as having cheated because they would have had to look at the answer key. Certainty was controlled by the presence of a test facilitator, while the severity was controlled by the existence of a penalty in the form of forfeiture of the studies non-bonus payment. They found that certainty had a greater effect than severity.

According to the literature, both the proper methods used to study certainty and severity as well as the results gained from those methods are sources of contention. However, the majority view appears to be that certainty is a greater deterrent of antisocial behavior than severity. Crucially, the behavioral study highlighted in this review supports the majority. Therefore, it was reasonable to hypothesize that the behavioral study conducted for this paper would reach a similar conclusion.

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Heuristics and Bias

In their seminal piece Kahneman and Tversky proposed that humans use heuristic principles to reduce the complexity of judgements under uncertainty (1974). The initial set of heuristics proposed were those of representativeness, availability, and adjustment, and anchoring. The representativeness heuristic is categorization based on characteristics, availability is the preference for easily retrieved concepts, while the adjustment and anchoring heuristic is the tendency to make conservative adjustments from an initial value. Heuristics are often framed by Kahneman in a problematic context; fast but illogical shortcuts that are harmful to good decision making. Morewedge and Kahneman (2010) describe two systems involved in processing; system 1 and system 2. System 1 involves fast intuitive judgements, whereas system 2 involves slow deliberate processing. The paper frames judgement errors as a failure of system 1 through bias, and as a failure of system 2 in its role as a filter. It should be noted that this approach has seen criticism; Gigerenzer and Gaissmaier (2011) argue that biases are every bit as useful as a logical approach but simply made to solve a different set of problems. Heuristics form a toolbox of efficient methods to generate judgements and are in some cases more accurate than logical counterparts. Risk assessment has been found to be particularly prone to bias and can be induced to varying degrees of magnitude through the way risk ratios are presented or compared to one another (Reyna & Breynerd, 2007). Research also suggests that people overestimate the likelihood of detection but will lower that estimation after being caught (Piquero, Piquero, Gertz, Bratton, Loughran, 2012). In general, people are very bad at making objective risk assessments; objective risk has little effect on perceived risk

according (Jacobs & Piquero, 2013). This could explain why research has found disparities between certainty and severity; people may have a bias towards one aspect of risk over the other, even when the sum-total of risk in two situations is the same.

Game theory

Game theory is a framework for studying the ways that individual decision makers affect each other that can be applied to a wide variety of models (Dufwenberg, 2011). For instance, the "Nicktacs" outlined later in this paper would be described as a finite, two player, constant sum, imperfect information game (Davis & Brams, 2017). A very common game model is that of the prisoner's dilemma (Dufwemberg, 2011). In the prisoner's dilemma, two players are separated by a wall with two buttons labeled cooperate and betray. If both players choose to cooperate, they both get one year in prison. If one betrays and the other cooperates, the betrayer gets goes free and the cooperator gets three years. If both betray, both players get two years. This point distribution can be seen in Table 1. Depending upon the distribution of points or years, a dominant strategy may emerge; in this example the dominant strategy is to always betray, as the betraying will always result in a better outcome regardless of the other players choice.

	Coop	*Betray*
Coop	*Both get 1 year*	*Goes free, other gets 3 years*
Betray	*Goes free, other gets 3 years*	*Both get 2 years*

Table 1. Prisoner's Dilemma

The dominant strategy will change depending on the points distribution and whether the game is repeated multiple times. When the game is repeated, a much more cooperative strategy called tit for tat becomes the dominant (Axelrod & Hamilton, 1981). Whereas the prisoner's dilemma is useful for modeling cooperative systems such as international politics, it lacks a certainty dimension and so can only model the effects of varying levels of severity. This made it unable to address the research question, however the repeated prisoner's dilemma provides a dimension that was desirable to the design of the method; it involves a campaign of repeated deceptions and allows for complex behaviors to be modeled over time. Much of deception in the real world is rapid and low latency in the same way as the iterated prisoner's dilemma. Scams for instance involve a series of lies that combine to deceive a target; a scammer calls a person with an initial lie about trouble with a credit card, then must make another series of lies to build rapport and convince their victim. Meanwhile the victim must ask probing questions to ascertain whether the caller is legitimate. Cyber warfare also involves iterative situations, where an attacker will probe for weaknesses through a series of calculated lies while the defender probes interactions and sets traps for attackers. The methodology used in this study replicated this aspect in its design by being similarly iterative.

Individual differences

When it comes to deceptive games, few have the clout or popularity of poker, and as such there are a number of studies based on it. Seale and Steven (2010) conducted a study in which participants played against a computer in a simplified poker game. In one condition the computer plays optimally, in the other it plays in such a way as to exploit poor play. Their hypothesis was that the participants would learn optimal play faster

when exposed to the exploitive condition. They found that neither condition lead to significant improvement even after 200 repetitions; bluffing was too infrequent, whereas calling was too frequent. The study showed that there were significant individual differences between players. This is in line with a study involving poker and Machiavellianism conducted by Palomäki, Yan, and Laakasuo (2016). They found that participants who measured for high distrust for others made larger bluffs on average, whereas those with a high desire for control had a higher frequency of bluffing. Neither of these papers address certainty and severity, however they do give insight into what a bluffing game could expect to see; a minimal or nonexistent increase improvement in play across games over time, and wide individual differences between players. A study by Jones and Paulhus (2017) investigated cheating and the dark triad in several studies. Of the relevant studies, one found that when given the opportunity to lie for a reward while the risk of capture is low, all three of the dark triad personality traits were predictive. When faced with the same game but a high risk of being caught, only those scoring high in psychopathy would cheat under normal conditions. Both high Machiavellianism and psychopathy were both predictive of intentional lies, a deliberate and direct lie to an experimenter. Because of this it would be expected that those that score highly on the dark triad in Machiavellianism and or psychopathy will have a higher rate of lying in general.

Individual differences are also highly relevant in a criminal justice setting. Income is a significant indicator in likelihood of arrest, for instance Grogger found that a $100 increase in earnings lowered the likelihood of arrest by a little less than one percent (1991). Similarly, psychopathy, categorized by callousness in concert with low self-

control, has been correlated with an individual's intention to commit white collar crime (Hare & Neumann, 2008). As a final consideration, it has been shown that both individual characteristics and the type of crime affect whether a person would be deterred (Wikstrom et al., 2011). For instance, some people simply do not see crime as a viable alternative to other actions, meaning deterrence has nothing to do with their lack of criminal activity.

Hypothesis

While still up for debate, the majority view within the literature is that certainty has a greater effect than severity in deterring antisocial activity. The hypothesis for this study was the same, that certainty will have a significant effect on a person's level of deceptions and that severity will have a smaller effect. Results from this study add to the current body of certainty and severity research by examining the relationship in a repeated deception context. Findings from this study could guide resource allocation, provide insight allowing for further study, and create a starting point for behavioral modeling.

CHAPTER 3

METHODS

Participants

Thirty participants were recruited for this study through the ASU SONA pool, through fliers posted on the ASU Polytechnic and Tempe campuses, and word of mouth. Participants were granted course credits for their time at the rate of 1 credit per hour, or $10 cash at their discretion. Of the 30 participants, only two took credit. Nine of the participants were observed to be female, 21 were observed to be male. Demographic data was not taken as a self-report, however most appeared college aged and participants were required to be over 18 to participate.

Materials

Game boards and instructions for Nictacs were printed on white printer paper. Mancala marbles were used as game tokens. A cardboard box roughly 3x2ft in size was used as a divider. Data were recorded on a clipboard. The short dark triad questionnaire was used to asses participant's levels of Machiavellianism, narcissism, and psychopathy (Jones & Paulhus 2014). Jolly Ranchers and Tootsie Rolls were used as game rewards, with one candy given for every ten points earned by the player across all games.

Design

The study used a 2x2 mixed design with certainty and severity as the two factors and the dark triad personality scores as exploratory data. Participants were tasked with playing four versions of a turn based bluffing game (Nictacs) akin to the board game "Battleship" in which deception is rewarded but carries risk. Measures included the total number of deceptions, number of times called, whether each deception is called. The

variables were the four combinations of certainty and severity, and the ratio of lies per hit. Each of the four combinations of high and low certainty and severity is represented by variations on the base game of Nictacs. Randomized partial counterbalancing was used to assign game orders to each set of participants, meaning that each participant experienced the conditions in a different order than the others.

Procedure

Participants were asked to give written consent. The two participants were assigned as player 1 or 2 using a coin flip. This assignment was used to decide who takes the first turn in the game as well as to deidentify the data. Each participant was then given 10 minutes to read through the rules of the game. The players were then walked through a few turns of a mock version of the game and were prompted to ask questions about points of confusion. The participants then played through the full bluffing game, taking approximately 30 minutes. They were then given 10 minutes to fill out the dark triad questionnaire. At the end of testing each player was given a candy reward, each picking out one candy from a pile for each sum of 10 points earned during the game. The full procedure took approximately an hour.

Nictacs

Each player had a 10x1 grid that is hidden from the opponent, much like Battleship, and each square in the grid is marked with the letters A through J. The game is taken in turns, with roles alternating between the caller and the receiver. To start a turn, the receiver places a marker on a square on their board. The caller then states a number of letters, 7 letters in the high certainty condition and 3 letters in the low certainty condition. If one of the letters matched the marker on the receiver's board, this is a hit. The receiver

then announces whether any of the stated letters matched the marker they placed, however if it was a hit they could lie about it. The shooter was then given the choice to believe the receiver's statement or call it as a bluff. The receiver's board was then revealed. Players were then awarded a number of points, Y, depending on the outcome and condition, with $Y = 3$ in the low severity conditions and 7 in high severity conditions. A confirmed hit on the receiver awarded the shooter Y points, an incorrect call deducted Y points from the shooter and awarded Y points to the receiver, and an uncalled lie awarded Y points to the receiver and no points to the shooter. Players were instructed not to give a false positive, i.e., say it was a hit when it was really a miss. Table 2 shows each of the five potential paths and their point allocations. When a turn is completed the roles reversed and the receiver became the shooter. When each player had been the shooter 10 times, the condition switches to the next in the order with each player will be the shooter 40 times across the whole game. At the end of the game each participant receives one piece of candy for every 10 points earned. One researcher recorded each of the game's 80 turns on a spreadsheet, specifically whether the shooter hit, whether the receiver bluffed or told the truth, and whether the shooter called a bluff or not.

Hit or Miss	Truth or Lie	Trust or Call	Shooter	Receiver
Hit	Lie	Trust	0	+Y
Hit	Lie	Call	+Y	-Y
Hit	Truth	N/A	+Y	0
Miss	Truth	Call	-Y	+Y
Miss	Truth	Trust	0	0

Table 2. Point allocation sheet

This design was chosen for a host of reasons. Unlike games like poker, Nictacs has very simple rules that allow for easy data collection. The simplicity also made it easy to learn, whereas a harder game may have prevented the use of strategy by overwhelming the participants. Unlike a prisoner's dilemma style game, the use of a 10-space board allowed for control over the likelihood of a hit. For instance, in low certainty conditions the likelihood of hitting was 3/10, while in high it was 7/10. As certainty and severity are not translatable into each other, it was decided that the best way to allow for comparison between the two would be to ensure that the same number of possible points were available in the low high and high low conditions. If a player hits the average of three hits per game in the low certainty high severity condition, and the opponent does not lie at all, the player gets 21 points. Likewise, in the High Low condition hitting the average of seven times at three points each nets 21 points. Three and seven were chosen for the high and low certainty and severity conditions because the neighboring paired numbers posed potential issues. The concern with using two and eight as values would be that effects would be obscured by extreme conditions. Only receiving an average of two lying opportunities per match in the low certainty condition may have increased error. Four and eight were also considered as values, however they had the opposite problem; with only a 20% difference between conditions, the concern was that participants would not evaluate them as significantly different. This left three and seven as the logical choice.

Players were instructed to never lie when the opponent missed. Preventing false positives this way allows for certainty to be controlled, and also fits closer to a real-world scenario; a person is not likely to say that they lied when they actually told the truth. A point penalty had to be implemented for incorrect calls, otherwise there would be no

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reason not to call every single time. Allowing each player to see each other was intended to simulate the social context that deceptive behaviors may take place in. Revealing the board each round was intended to facilitate rapid play. Allowing the player to place their marker wherever they choose rather than being randomly assigned a space to place their token each turn was chosen to allow for strategy. Candy was used as a reward so that the severity of punishment could be contextualized as a tangible consequence, while the ten-point threshold for each reward was chosen to limit the amount of candy that would need to be distributed.

Short Dark Triad

To measure Machiavellianism, psychopathy, and narcissism, a validated questionnaire was used (Jones & Paulhus, 2014). The questionnaire had 9 questions for each of the three personality traits, and asked participants to answer each using a five item Likert scale.

Analysis

A within subjects repeated measures 2x2 ANOVA was conducted on the data, with the lies per hit ratio (LpH) as the variable and certainty and severity as the factor. Linear regression was performed on the dark triad and each player's the average LpH as an exploratory analysis. For a rough comparison of reliability, the means of dark triad scores were compared to those of previous studies that provided descriptive statistics of mean, standard deviation, and that were separated by gender. The first set of means come from the initial creation of the short dark triad, both come from the validation portion of the creation process after the short dark triad test had been completed (Jones & Paulhus, 2014). The first study had 279 participants with 46% being female, the second had 230

participants with 58% being female. Further demographic data was not reported. The second set of means comes from a study that compared the short dark triad to the HEXACO personality test (Book, Visser, & Volk 2015). The first study had 355 participants with 68% being female, the second had 325 participants with 64% being female.

CHAPTER 4

RESULTS

The high certainty low severity (HL) condition had the lowest mean of lies per hits (M =
.325, SD = .262), followed by HH (M = .358, SD = .272), LH (M = .440, SD = .33), and
finally LL with the highest mean (M = .550, SD = .308). An alpha value of .05 was used
for all statistical tests. The means of each condition with can be seen in figure 1, with
error bars at 95% confidence intervals.
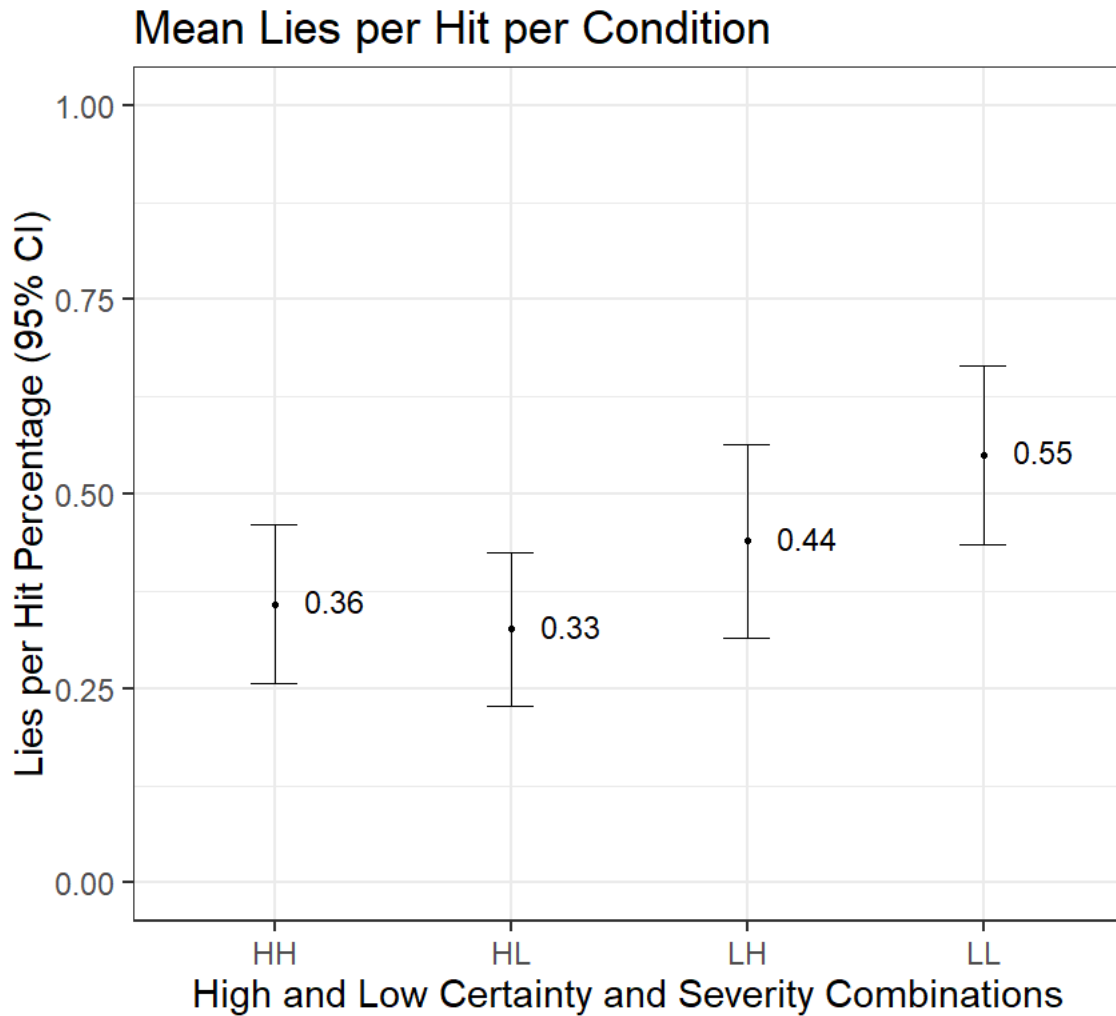
Figure 1

A mixed factor analysis was used, comparing the effects of certainty and severity as well as the interaction effect of certainty and severity on the ratio of lies per hit. A main effect was found for certainty $F(1,29) = 8.95$, $p = .006$, $\eta^2 = .236$. No main effect was found for severity $F(1,29) = .705$, $p = .408$, $\eta^2 = .024$, and no interaction effect was found $F(1,29) = 2.38$, $p = .134$. $\eta^2 = .076$.

Descriptive statistics were generated for the dark triad traits and grouped by gender. Machiavellianism measured at ($M = 3.45$, $SD = 0.52$) and ($M = 2.72$, $SD = 0.81$) for males and females respectively, ($M = 2.79$, $SD = 0.41$) and ($M = 2.75$, $SD = 0.41$) for narcissism, and ($M = 2.24$, $SD = 0.64$) and ($M = 1.68$, $SD = .40$) for psychopathy. Simple linear regressions were run on the average lies per hit across conditions and each of the three dark triad traits and showed no clear relationship. This can be seen in figures 2-4. The same analysis was conducted on each condition compared and each of the dark triad; these were similarly devoid of pattern (See Appendix A). Gender delineated dark triad mean comparison graphs were generated (See Appendix B).

Figure 2

Figure 3

Psychopathy and Average Lies per Hit
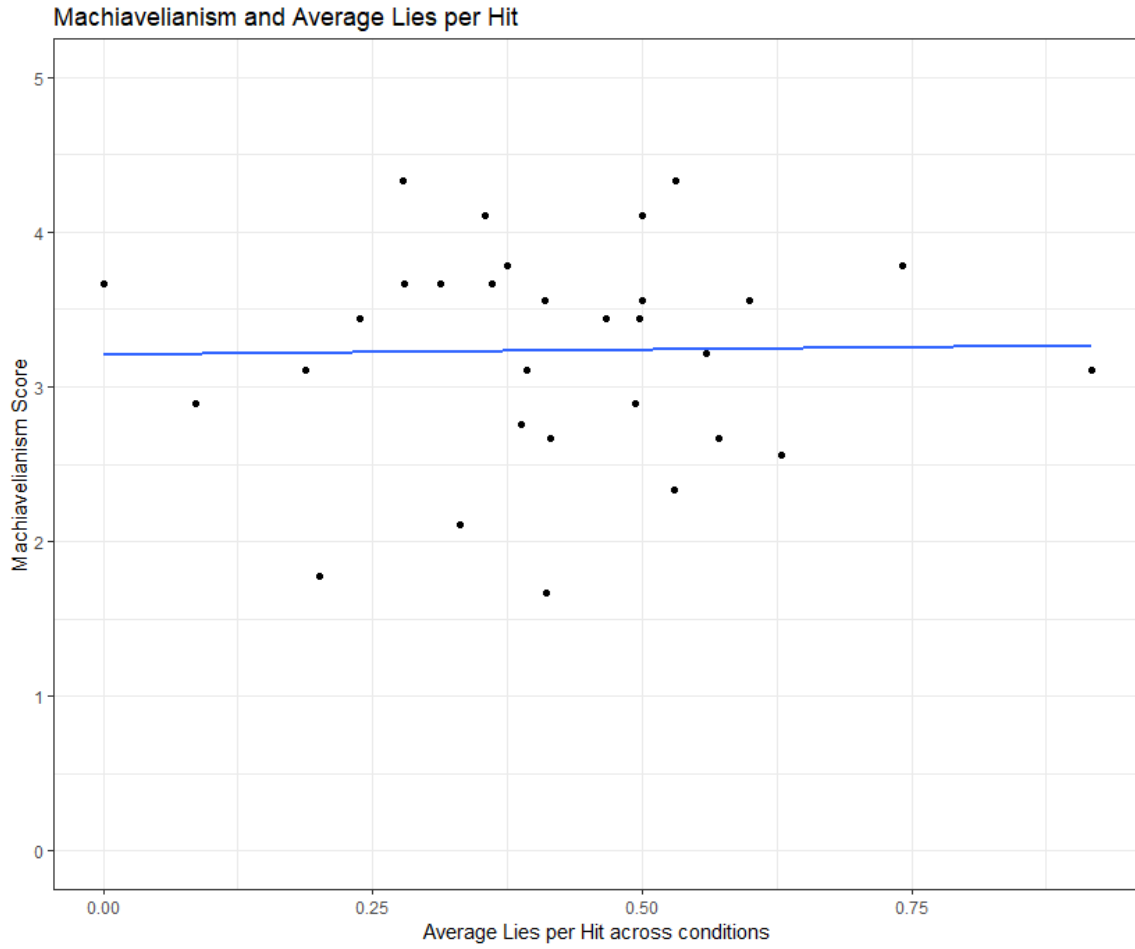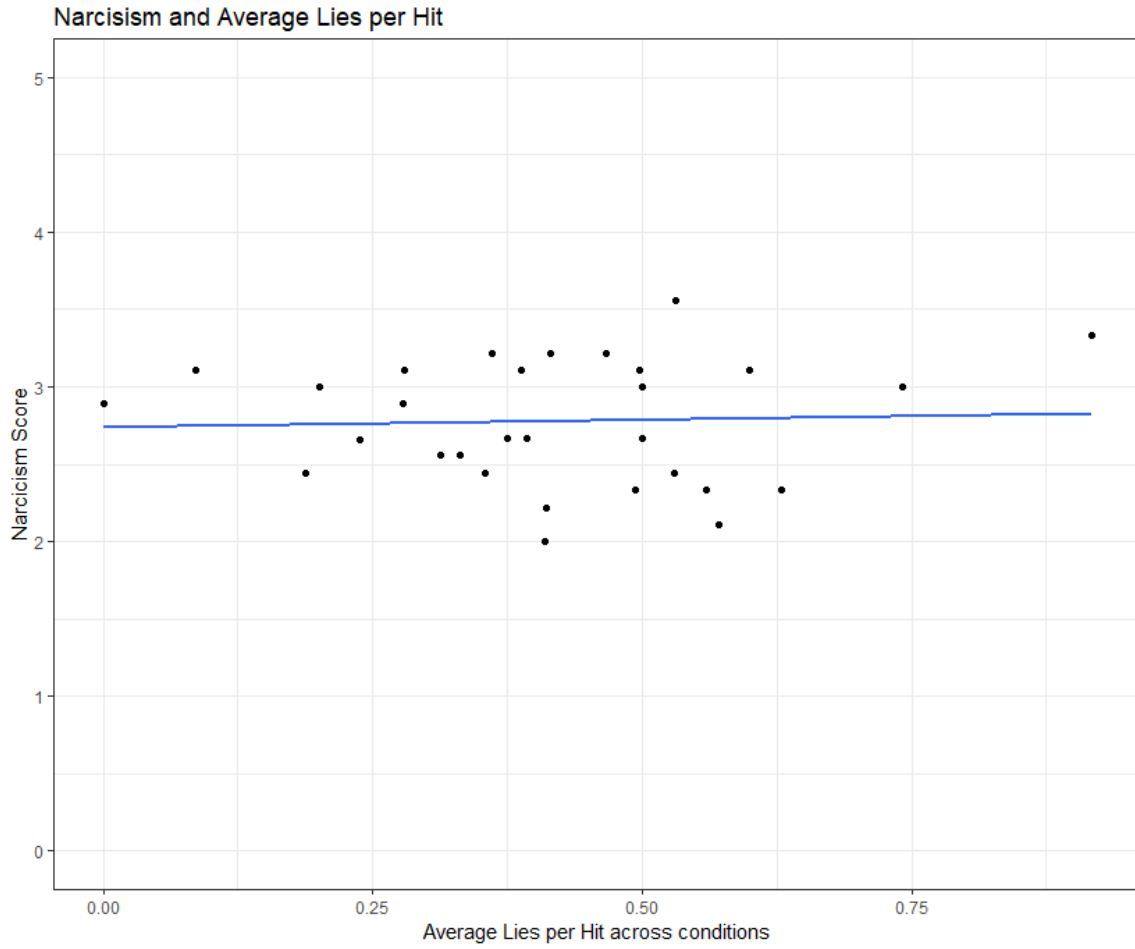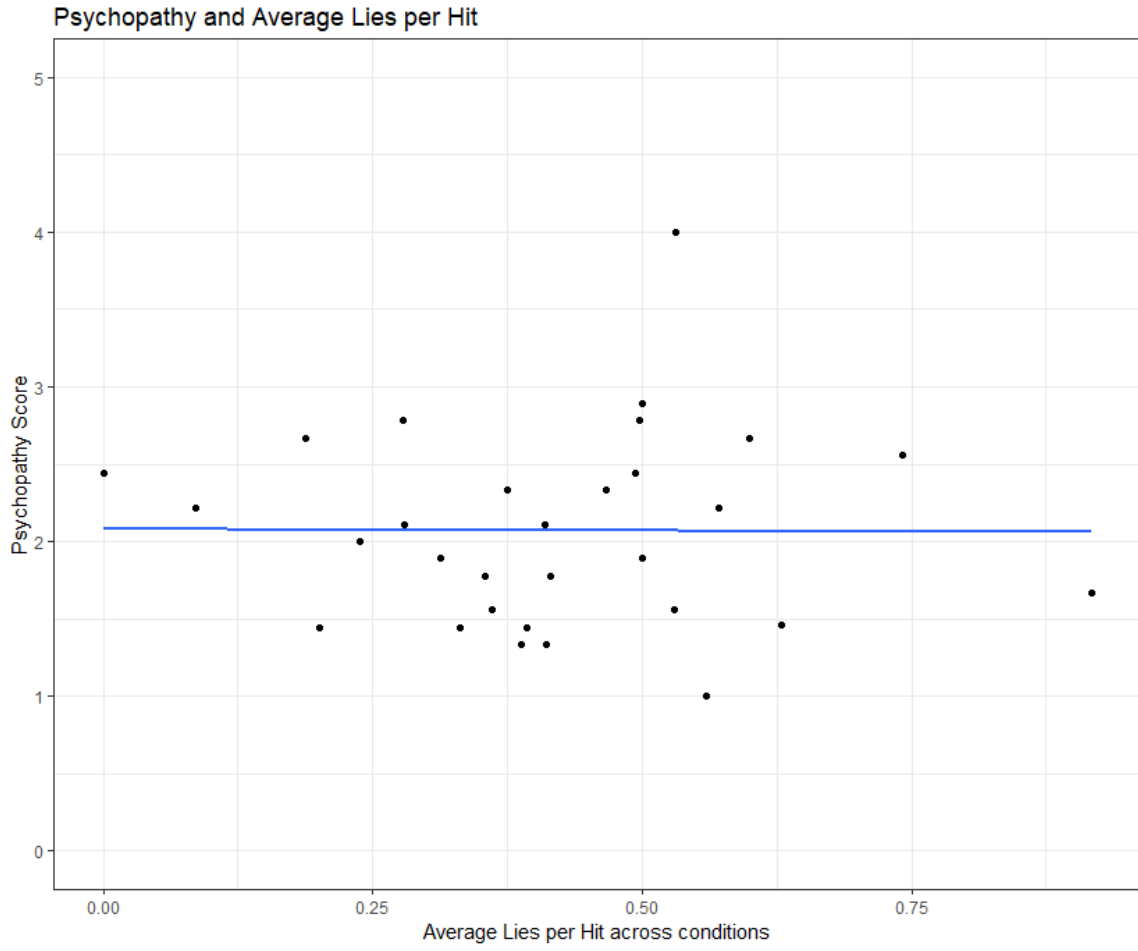
Figure 4

CHAPTER 5

DISCUSSION

The study examined whether the likelihood of discovery or the penalty upon capture is greater at preventing deception. As analyses revealed, certainty has a significant effect on a person's likelihood to lie while severity does not. This is in line with the majority opinion within the literature and thus supports the hypothesis. One reason why the findings do not coincide with the more niche views is because the methodology is so much different. Silberman (1976) used a self-report crime inventory of college student and a complex correlation analysis to explore certainty and severity. His findings suggested that those with high levels of criminality would only be deterred from extreme crimes by high severity, which is untestable in a behavioral context. Mendes (2004) was critical of the severity and certainty framework and conducted an algebraic analysis on an older certainty and severity model. She found that months served for robbery had a deterrent effect, while arrests and convictions do not. She argued that all three components must exist for crime to be deterred, and that criminals combine the risk components. Her method differs sharply from the one used by this study, as it is not a behavioral one.

The dark triad means appear to be roughly in line with previous research (See Appendix B), and it would be difficult to make any hard conclusions due to the relatively low sample size. Exploratory analysis failed to uncover any obvious trends on participants' lies per hit, which was unexpected given that previous studies have found relationships between elements of the dark triad and the rate of deception (Jones & Paulhus, 2017; Palomäki, Yan, & Laakasuo, 2016). It would be unsurprising if for

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instance high scorers in Machiavellianism and psychopathy were found to lie more frequently in general, but that does not appear to be the case here (Jones & Paulhus, 2017). The likely explanation here is sample size; this study had a sample of 30 participants, while the studies that found significance in this area had sample sizes numbering in the hundreds. This of course allows for a more accurate analysis.

Limitations

Although there were significant effects found between the variable evaluated, there are several limitations to acknowledge. Foremost is the sample size, a sample size larger than 30 may have given more accurate results. The behavioral study conducted by Nagin and Pogarsky (2003) used a sample size of 256, however they used a between-subjects design while this study used a within-subjects design which gives this study additional power. While severity proved to be insignificant as a deterrent it may be the case that it may become significant with a larger sample size. The dark triad also may have shown a better trend if a larger sample size were obtained, as the psychopathy and Machiavellianism did not have a positive relationship with frequency of lies as expected. (Jones & Paulhus, 2017).

In retrospect, revealing the board after every turn may have influenced the likelihood of calling in an unrealistic way, allowing for more rapport building through the proof of truths and potentially making lies more difficult. There are certainly many real-world scenarios where proof of truths and lies cannot be affirmed. Significance was still found under these conditions even if there was a stifling effect on deception, so this limitation is likely not severe. Not randomly assigning a player their space to be shot at had pros and cons. The intention was to allow an element of strategy into the game as

deception does have strategic elements, however leaving strategy uncontrolled may skew results. For instance, it may be the case that players are slightly better or worse at calling lies that are predicated on user placement of their game piece as opposed to randomized ones.

It is impossible to decouple risk from reward, as a motivation needs to be in place for most people to commit deceptive act. An option that was considered would have been to make reward a constant value, five points for successful bluffs in all versions of the game. It was decided that reward should be tied to severity, as the severity of the punishment tends to roughly coincide with the severity of the crime in real life. This choice created realism in the study but may have introduced a confounding variable. Furthermore, the magnitude of the risk and reward matters; deceiving in a game context with the goal of earning candy is very different than deceiving with the goal of stealing a car, government secrets, or a great deal of money. The test environment was very low stakes and candy is a very light reward, however crime often comes with a high reward that is further amplified by factors like income (Grogger, 1981). It would be unethical to properly replicate those severe conditions, however a more significant reward such as a cash prize may have had more validity.

Future Research

Even with those limitations considered, Nictacs game has produced promising results data, and with proper tuning and validation could prove useful in further behavioral studies of certainty and severity. It also created a relatively easy data recording environment while still retaining a high level of behavioral complexity; further research could adapt it to study rapport building, calling behaviors and relationships, etc.

A similar study with a larger sample size would of course be extremely valuable. Future studies could also include variations on the risk and reward; collecting data when high and low severity is at 2 and 8 as well as 3 and 7 could allow researchers to thresholds of willingness to lie or other patterns.

There was no significance found in either the effect of severity or from the certainty/severity interaction effect on lies per hit; however, if the means from this study held true under a larger sample size, it could conceivably uncover a smaller but significant effect for those two factors.

Finally, a wizard of oz style study using Nictacs as a base could prove valuable by controlling exactly when a shot would hit and the frequency of called lies. This would help control variance by giving each participant the exact same experience.

Conclusion

This study set out to determine whether certainty was a greater deterrent to crime than severity and found that this was indeed the case. This supports the majority view within the literature. Furthermore, the study shows that the majority conclusion replicates in the context of repeated interaction. This suggests that increasing the perceived likelihood of capture may be the best route in deterring deceptive behavior when there is the opportunity for repeated deception, such as scams, cybercrime, etc. An unexplored but extremely important factor in low latency deception is that of perceptual instability. It has been shown that perceptions of risk change over time; for example, people that get away with writing bad checks are more likely to decrease their estimation of risk over a one-year period than those that have not (Paternoster, 1987). Evaluating low latency

perception changes in the context of varying certainty and severity appears to be the next

logical step in research.

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APPENDIX A

EXPLORATORY ANALYSIS OF CONDITION AND DARK TRIAD
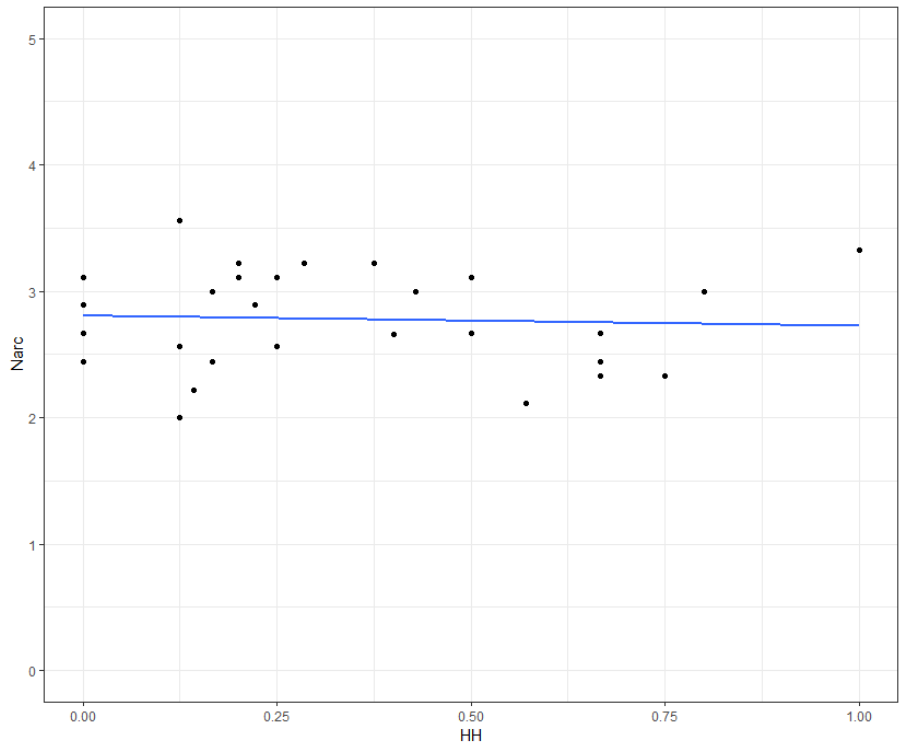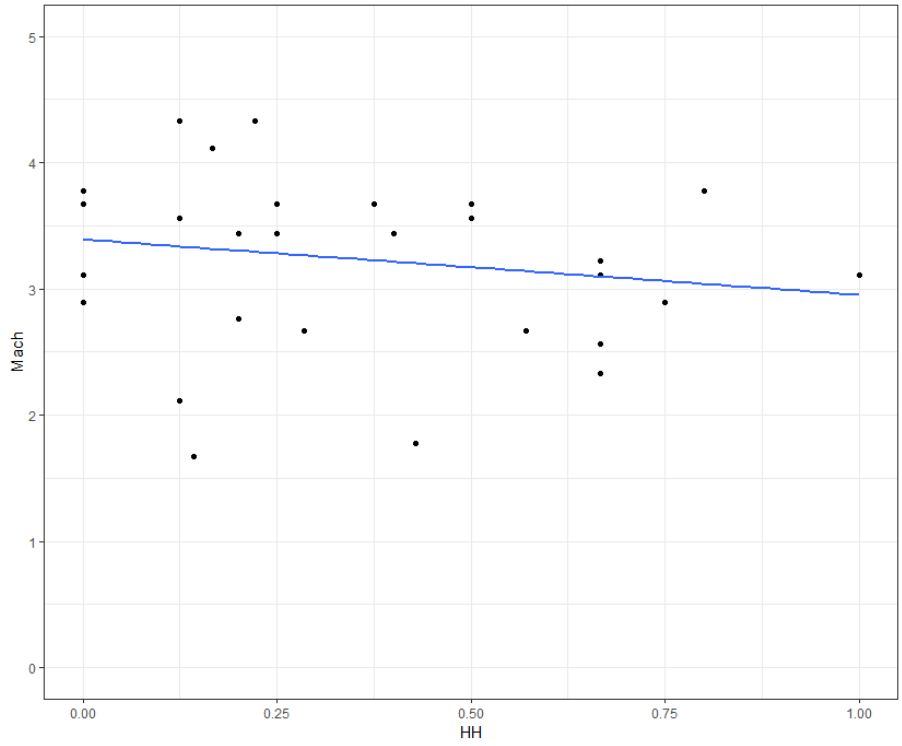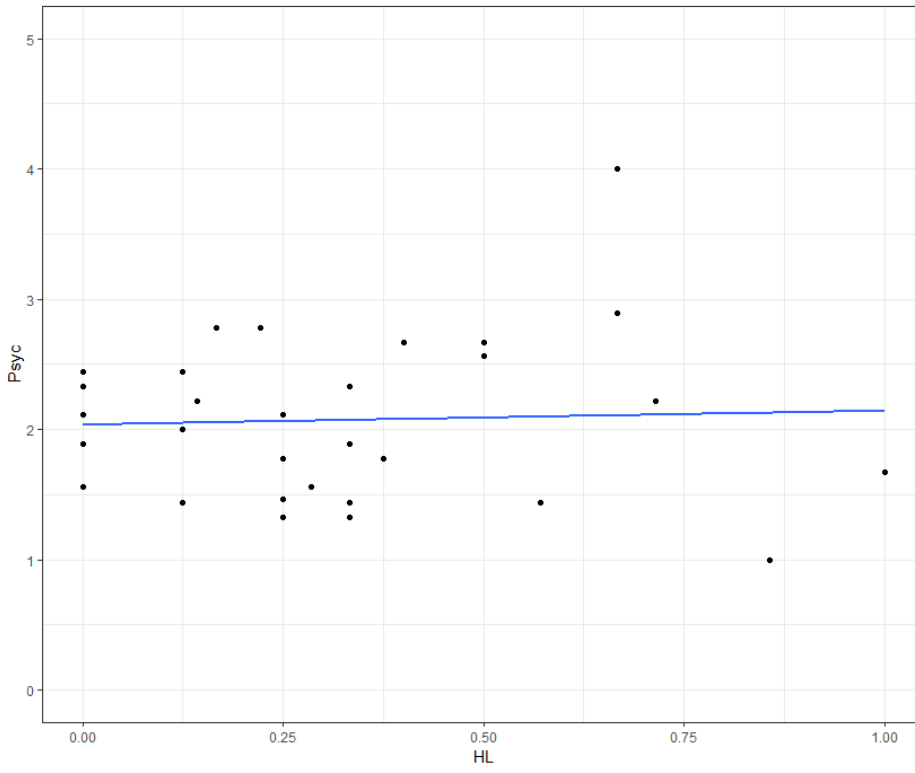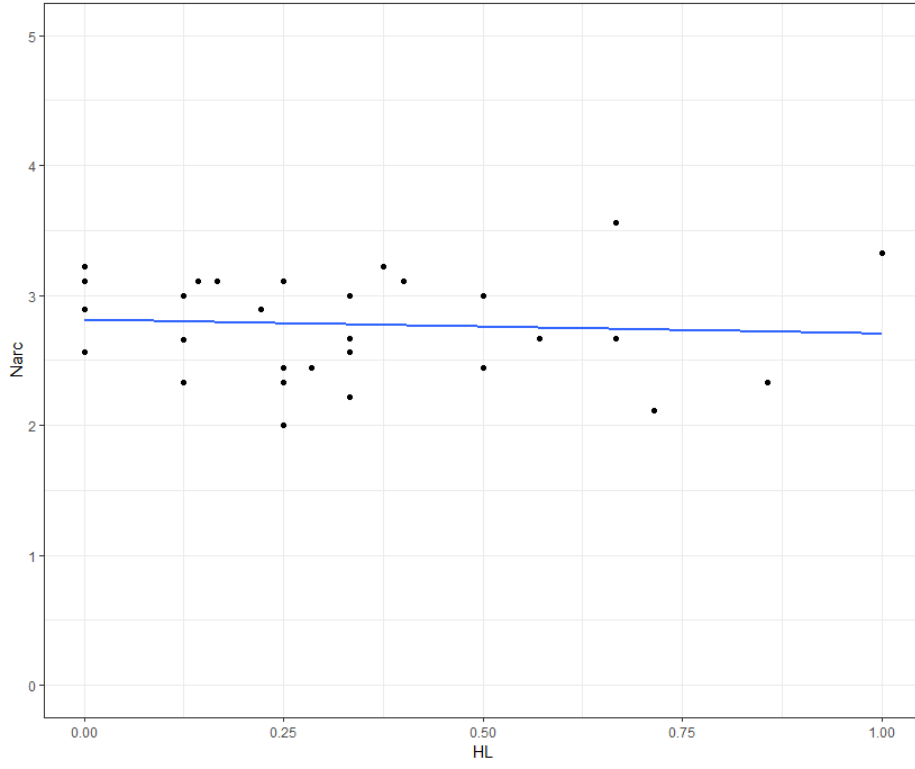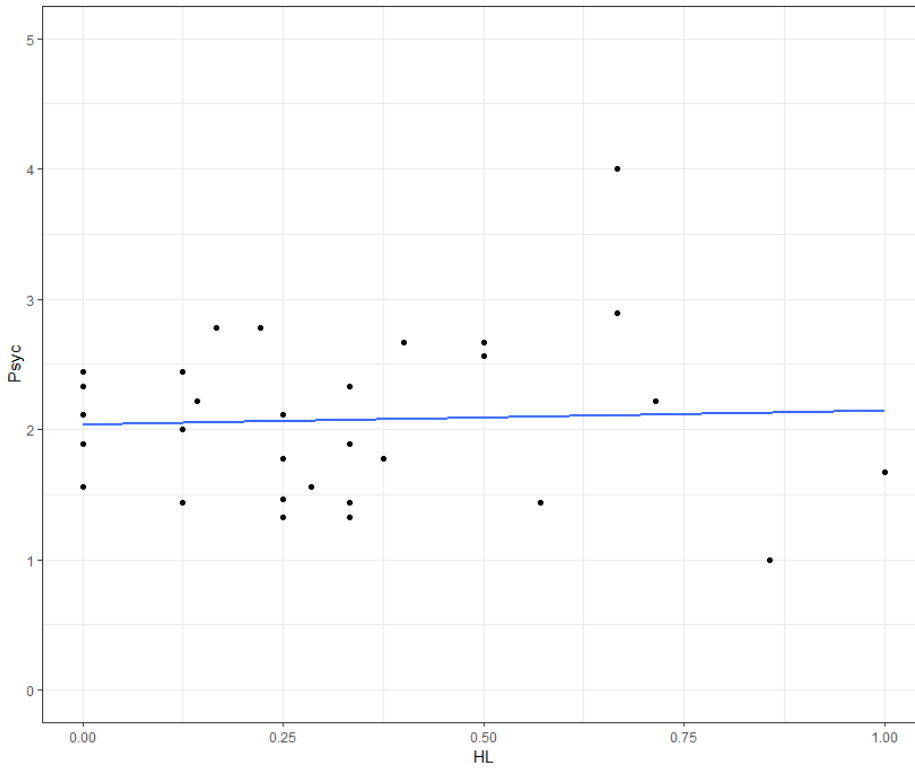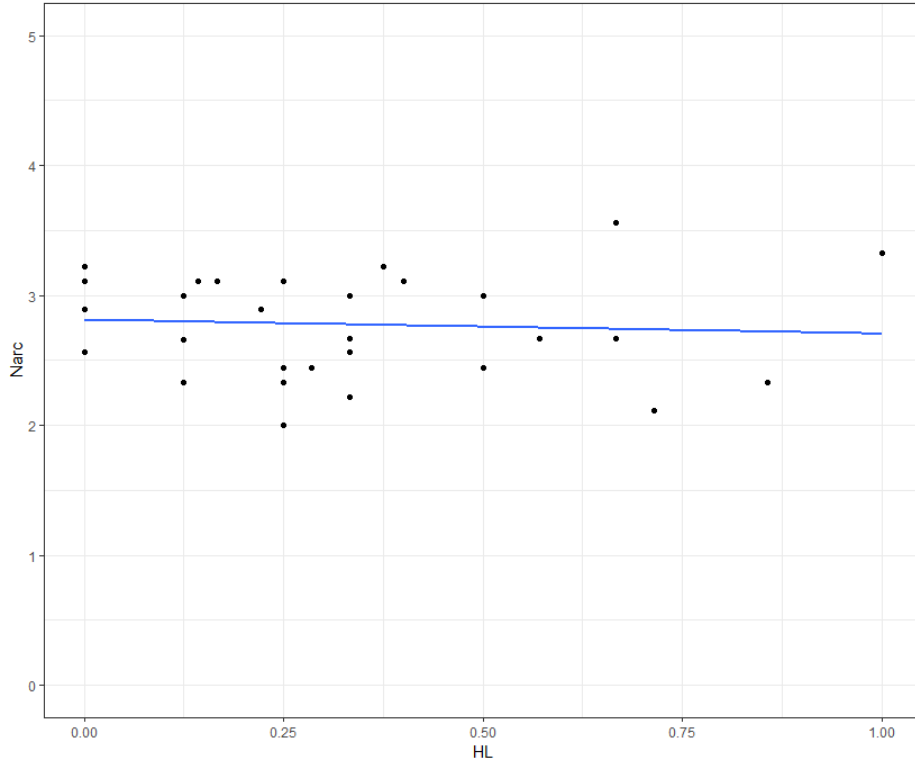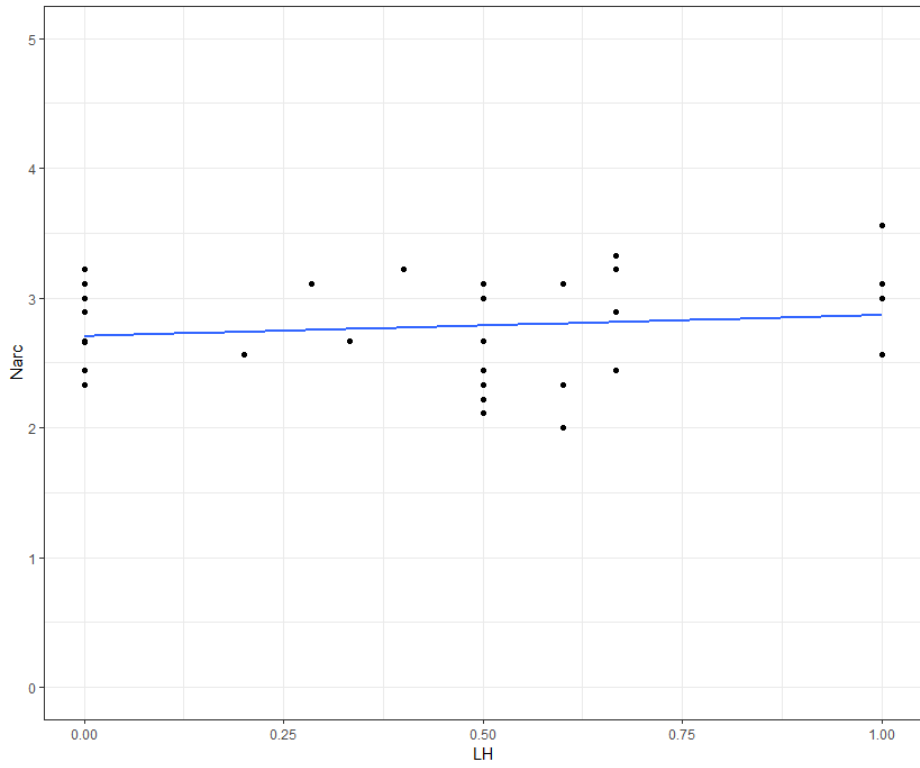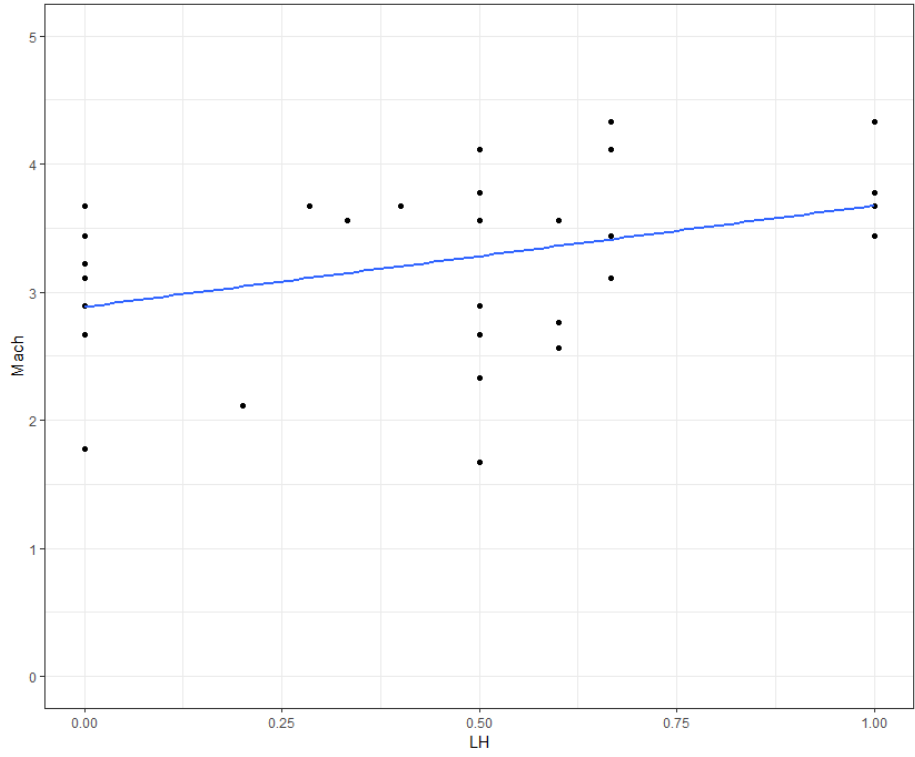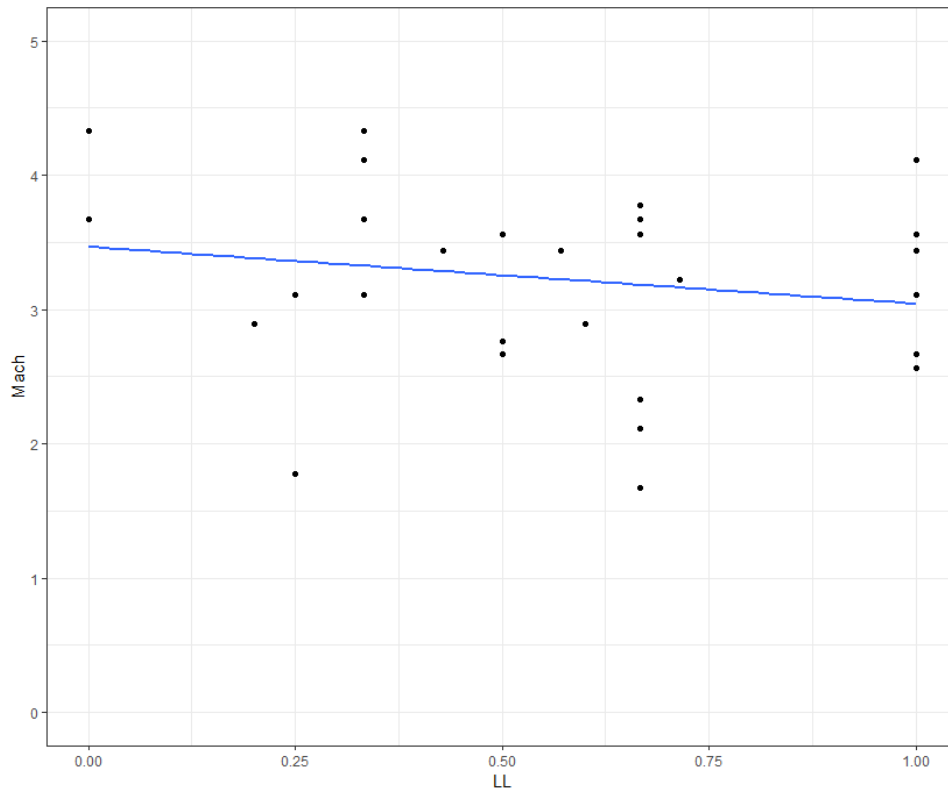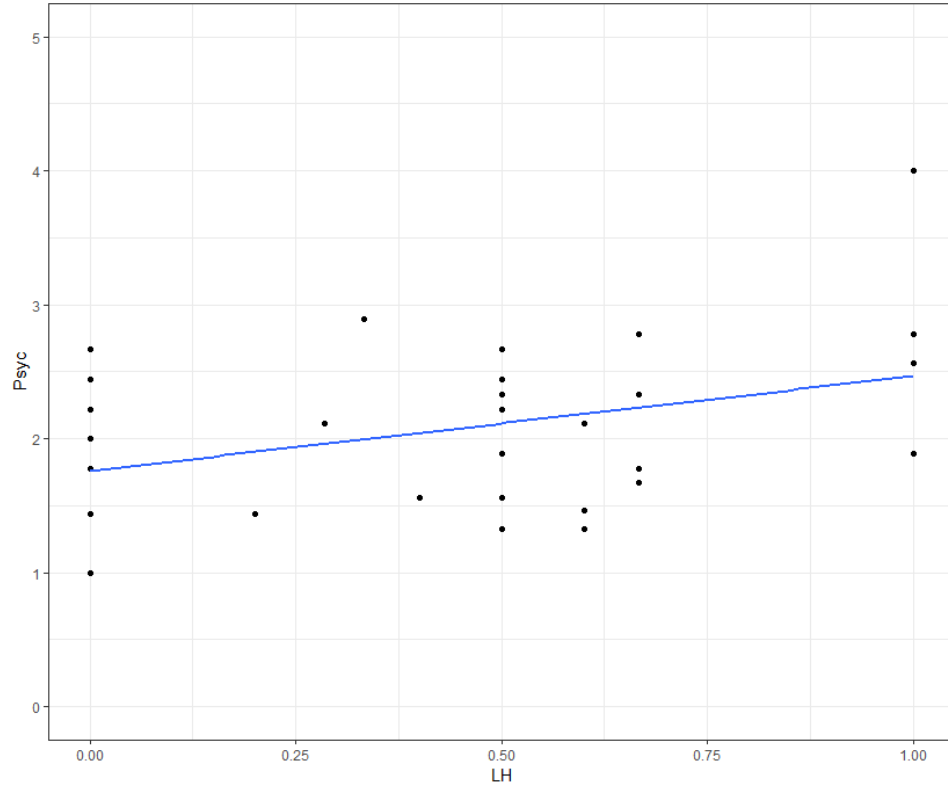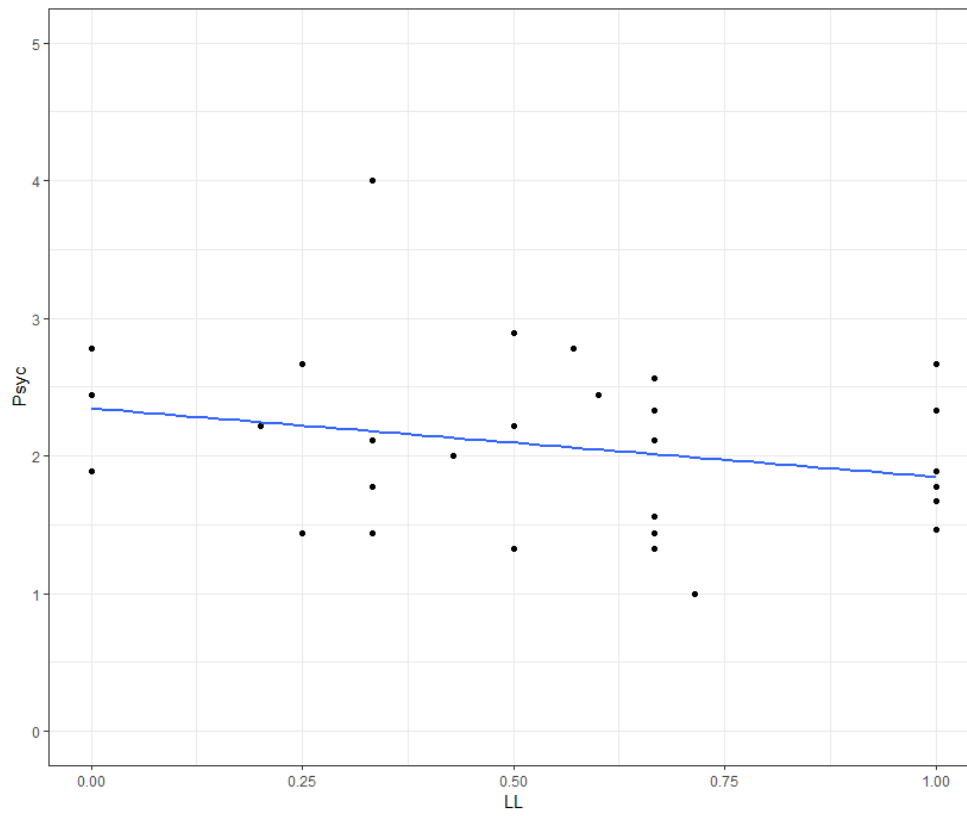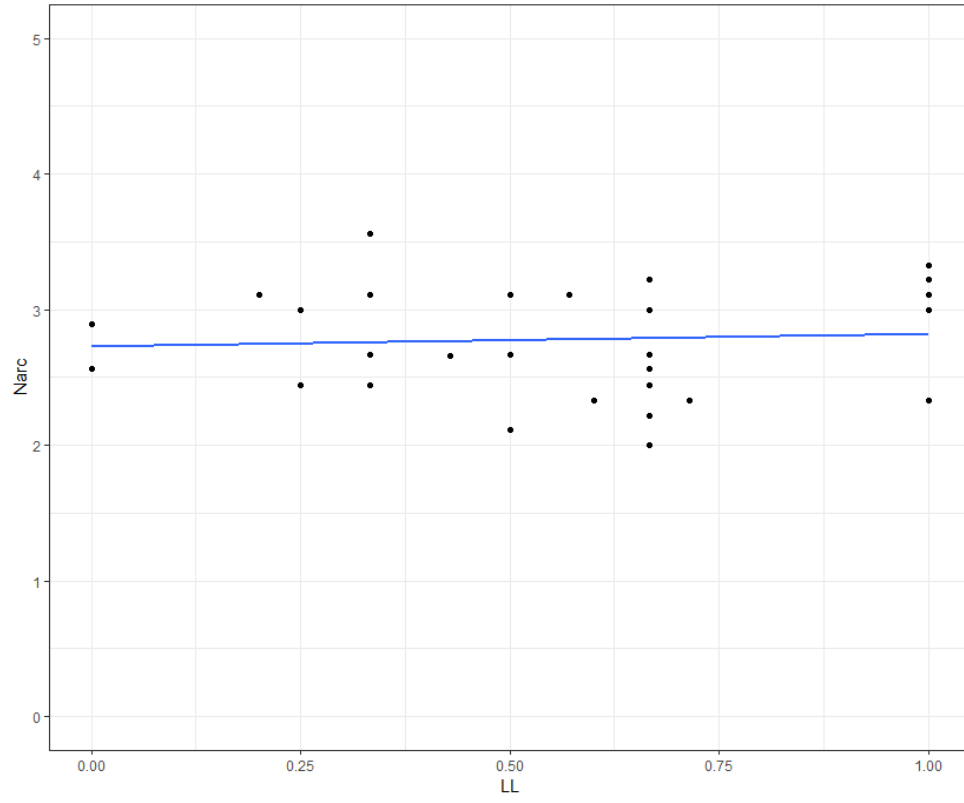
APPENDIX B

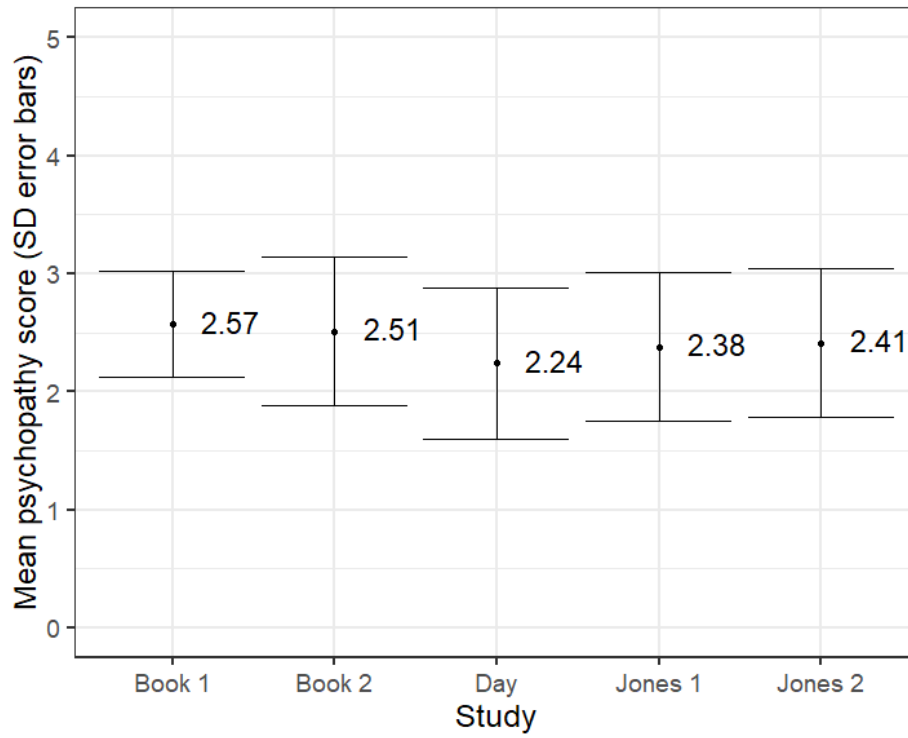GENDER DELINEATED DARK TRIAD MEAN COMPARISONS
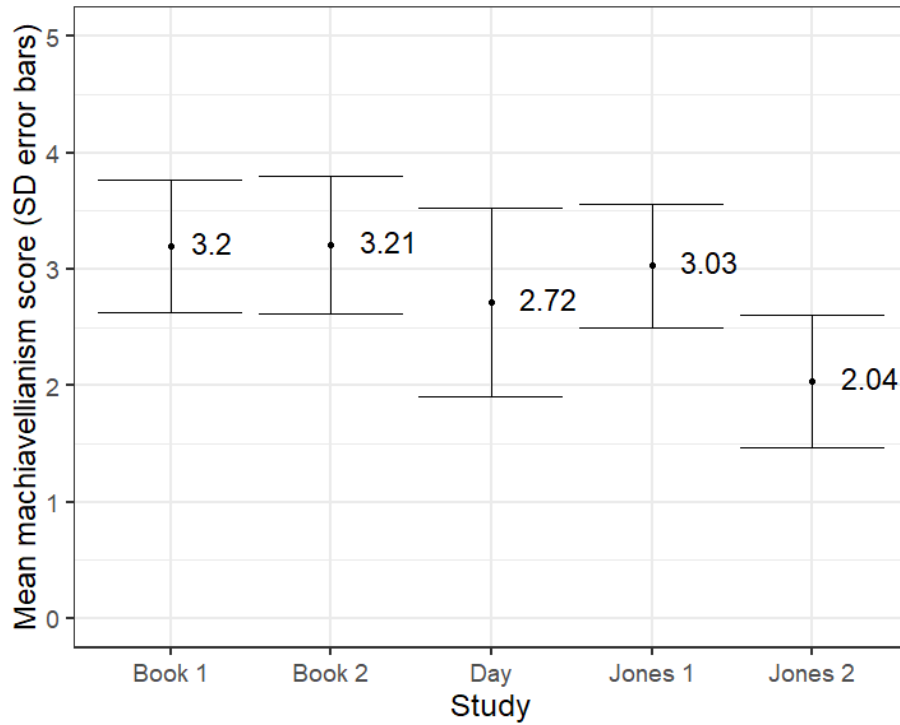
Mean male machiavellianism by study
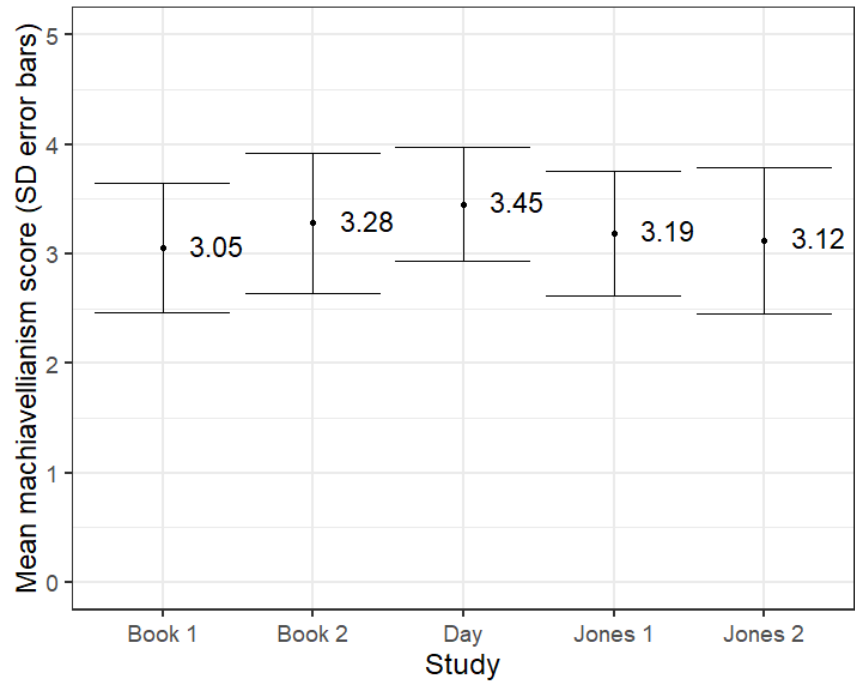
Mean male narcissism by study
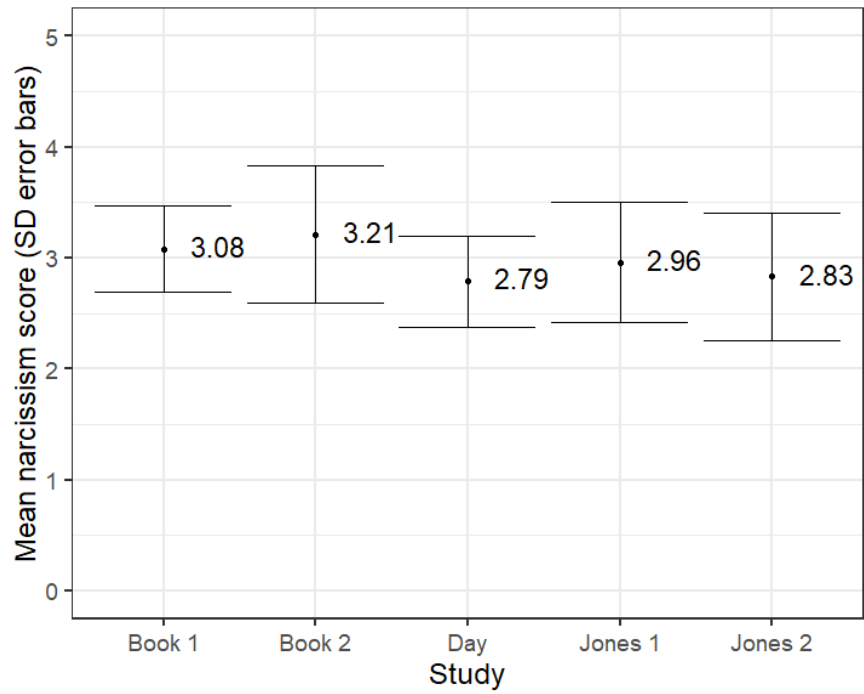
Mean male psychopathy by study

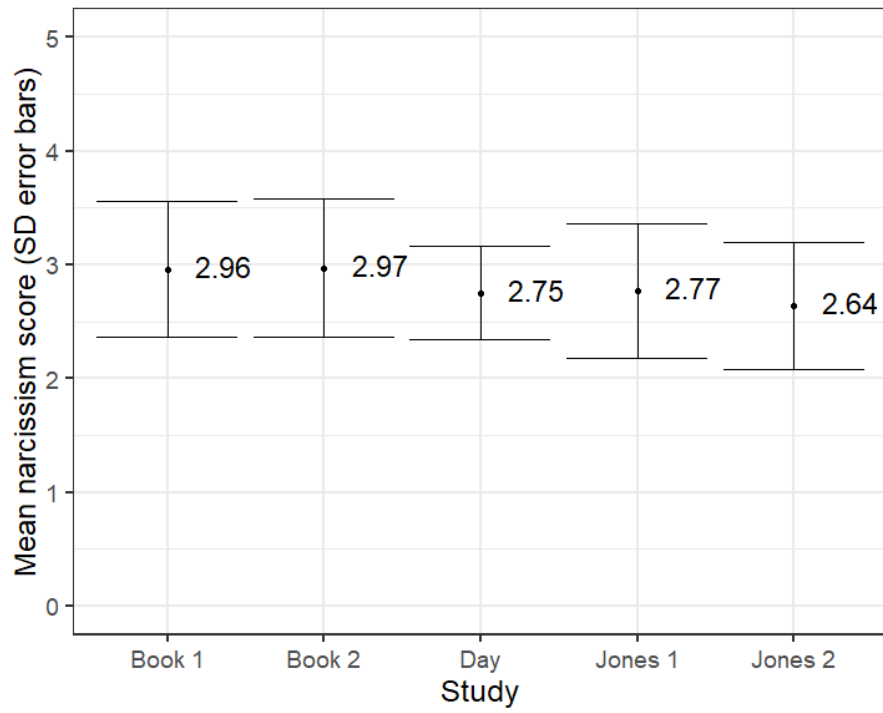## Mean female machiavellianism by study

Mean female narcissism by study

Mean female psychopathy by study