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Zhiying(Bella) Ren April 3, 2020

A Novel Methodological Approach to Measuring Cheating Behaviors

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Abstract

A Novel Methodological Approach to Measuring Cheating Behaviors

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The present study proposed a new method to measure cheating behaviors and study traits related to cheating. A total of 544 participants were recruited from Amazon Mechanical Turk to participate in the study. A computer-graded question was used to evaluate participants' *actual* knowledge about a subject; a self-graded question was used to evaluate what participants *self-report* knowing about the same subject. A monetary incentive was provided, and participants had the opportunity to earn more by misreporting. An inconsistency between participants' *actual knowledge* and their *reported knowledge* suggests potential cheating behaviors. To evaluate the method's validity, the study investigated whether cheaters identified by the method also consistently cheat more in other behavioral games. The method was then used to investigate the relationship between cheating and demographic variables of interest. Cheating was found to be significantly correlated with political extremity. For cheating's relationships with other variables, data analyses revealed associations consistent with expectations, though not at a significant level. The method was then used to examine the cognitive mechanisms behind self-serving and altruistic cheating. Results showed that people were significantly more likely to cheat for themselves than for charity donations. Meanwhile, cheating for an altruistic cause was not associated with a significantly higher increase in self-perceived morality. This study contributed to the existing literature by providing a novel and reliable method for investigating research questions related to unethical behaviors.

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A Novel Methodological Approach to Measuring Cheating Behaviors

Cheating, in all forms, is a byproduct of rules. In addition to social and moral costs, it has effects that are difficult to quantify. Researchers have long since realized the importance of studying why people cheat, when they cheat, and what they do after cheating; studies related to cheating span from economics (Slemrod, 2007) to sports (Ponseti Verdaguer, F. J., Cantallops, J., Borràs Rotger, P. A., & Garcia Mas, A., 2017), and from academic exams (McCabe, Trevino, & Butterfield, 2001) to video games (Consalvo, 2009). Based on Federal Tax Compliance Research, of a $458 billion annual average gross tax gap for TY 2008-2010, $387 billion was attributed to the underreporting of true income. In countries such as Argentina, Mexico, and Nigeria, political parties used material goods or cash to trade for citizens' votes (Stokes, 2005; Cornelius, 2004; Gans-Morse, Mazzuca, & Nichter, 2009).

Even though cheating is an important topic due to its impact, the nature of cheating also makes it particularly challenging to study. To identify a cheating individual, researchers need to know whether there is an inconsistency between the person's *reported state* and *true state.* The *reported state* is what the individual presents to the public, while the *true state* is the actual information. An example is the contrast between the tax amount people report to the government and the actual amount they are supposed to pay. The difficulty in studying cheating is that most of the time, researchers can only observe people's *reported state*, while the *true state* remains unavailable.

To date, researchers have approached this issue in several ways. One method is to ask respondents to directly self-report the inconsistency between the *true* and the *reported state.* Self-report provides an efficient and convenient method to collect relatively large-scale data. It

has been predominantly used to study cheating behaviors in an academic context (Marsden, Carroll, & Neill, 2005; McCabe, 2005; Huss et al., 1993). However, one prominent problem with self-reporting is socially desirable responding, which refers to participants' inclination to give answers in ways that are consistent with social standards (Fisher, 1993). Given that cheating is generally regarded as undesirable, respondents are motivated to report their attitudes towards cheating in a socially acceptable way (Gardner & Melvin, 1988). Therefore, if researchers employ direct questions, such as "I strive to succeed in any way, including cheating" (Ziv, Hoftman, & Geyer, 2012), participants' *reported responses* may deviate from their *true responses*, with likely under-reporting of cheating behavior.

Another concern associated with the self-report method is that it might not be a good indicator of behavioral intention. Breckler (1984) proposed in their tripartite model that cognition (i.e., conscious thoughts and beliefs) and behaviors (i.e., behavioral intentions or actual actions) are two distinct factors. While cognition could be captured by explicit verbal report, people's actual behaviors usually deviate from what they state in questionnaires. The concept of an empathy gap also suggests that people usually fail to accurately predict how a specific visceral factor might influence their future behavior (Loewenstein, 1996). A typical example is smokers' tendency to overestimate their ability to suppress their craving when they are in a "cold" session, where they are not currently experiencing the crave for smoking (Sayette, Loewenstein, Griffin, & Black, 2009). Similarly, if a self-report questionnaire asks participants to image when they are prone to cheat, participants' predictions could deviate considerably from their actual behaviors when given the actual opportunity to cheat. Consequently, self-reported attitudes towards cheating tend to be poor indicators of respondents' actual behaviors.

Noticing the deficiencies of self-report, experimental psychologists and economists became interested in observing people whose *true* and *reported state* diverge in a naturalistic environment. To achieve this, researchers create opportunities for people to cheat and then observe their behaviors. For instance, in a field experiment, researchers gave diners different amount of excessive cash change and observed whether the diners would return the change (Azar, Yosef, & Bar-Eli, 2013). The researchers also observed how demographic variables such as gender are associated with the likelihood to return the change. The naturalistic setting of the study offers several advantages. Firstly, it is relatively easy to accurately identify the inconsistency between the *true state* and the *reported state*. In such a setting, the *true state* (i.e., the money does not belong to the diners) is already known to the researchers. Therefore, researchers only need to know people's *reported state* (i.e., whether they claim the money) to identify cheaters. Moreover, since the naturalistic environment highly resembles situations in real life, the study could generate findings that have higher external validity. However, despite these advantages, researchers have little control over experimental manipulations in naturalistic studies. In addition, even though a naturalistic study design could be particularly valuable for some research topics, using it as a tool to systematically study cheating behaviors requires an unrealistically high amount of time and effort.

More often, experimenters study cheating in a laboratory environment, where they measure both the *reported state* and the *true state*. Most of the time, lab experiments allow researchers to carefully control experimental manipulation and draw rigorous conclusions. However, since cheating behavior is highly susceptible to the influence of social desirability, it is necessary to pay additional attention to potential violations of the non-interference assumption. The non-interference assumption states that a participant's potential outcomes should be

independent of other participants' treatment assignment. In this particular context, the assumption also requires that a participant's potential outcome would not be influenced by his or her previous treatments or the expectation of future treatments (Gerber & Green, 2012).

In a lab experiment related to cheating, when measuring participants' *reported state* and *true state* at the same time, the measurement of one state inevitably influences the response to the other state. Specifically, *after* participants report the *true state*, they would be reluctant to cheat in their *reported state*, as they know such acts can be detected. Consequently, a paradox exists: to know the *reported state*, researchers need to create an environment where participants can cheat; meanwhile, this environment eliminates the opportunity to collect accurate information on participants' *true state* had they not been able to cheat in an alternative environment. The vice versa also holds true.

The dilemma could be illustrated via past studies. For instance, in an experiment related to cheating and personality traits, the experimenters gave participants trivia questions and told them that higher accuracy rates would lead to a bonus. The experimenters also handed out the answer key at the beginning so that participants could cheat, even though they were told not to (Nagin & Pogarsky, 2003). In this case, allowing participants to cheat eliminates the possibility of learning their honest responses; therefore, the researchers could not compare the *true* and the *reported state* to identify cheaters.

The study addressed the dilemma by giving participants questions that were so obscure that it was unlikely they would know the correct answers. Therefore, participants were assumed to have a *true* accuracy rate close to zero; those who had a high accuracy rate were regarded as cheaters. However, one concern is that participants' fear of being caught could influence their behaviors, subsequently confounding the results in unpredictable ways.

This potential concern can be further illustrated in other research related to cheating and personality. For instance, in a study related to cheating and sensation-seeking, participants and a confederate answered trivia questions posed by a researcher. In the middle of the experiment, the researcher left the room. During the researcher's absence, the confederate suggested checking the answer sheet and marked participants who checked as cheaters (DeAndrea, Carpenter, Shulman, and Levine, 2009). The study results showed that cheating and self-reported sensation-seeking were positively correlated. However, participants who cheated in the experiment had to violate rules in front of strangers, which requires a relatively high tendency to engage in sensation-seeking and risk-taking. Therefore, it is likely that the method only identified cheaters with a high sensation-seeking tendency, while the majority of cheaters who worried about being caught were not identified.

In an attempt to address these concerns, researchers invented the "mind game," where participants think of a number between 1 and 6 and then roll a die. If the number on the die is the same as the number they had in mind, participants receive a bonus (Kajackaite & Gneezy, 2017). Since researchers cannot check the number in the participants' minds, the fear of being caught is assuaged. By comparing the distribution of participants' responses with the true probability distribution, researchers can estimate the proportion of people who cheated in the game. This design enables experimenters to examine cheating at an aggregated level. Nevertheless, a method that can identify individual cheating behaviors is still needed.

In short, although previous methods have provided valuable insights into cheating, it is still necessary to develop a method that can more accurately identify cheating individuals without arousing social desirability concerns. The present study contributed to the existing literature by proposing a novel method that can accurately capture people's behavioral

tendencies to cheat. The method allows researchers to investigate specific factors associated with cheating behaviors while addressing concerns such as social desirability.

The current research is composed of two studies. The first study aimed to examine the proposed method's validity. In this study, the method was compared with the mind game to test its convergent validity. The method was then used to investigate the relationship between cheating and several demographic and personality traits of interest. The second study aimed to illustrated how the method could be incorporate into experimental design. In this study, the method was used to investigate the cognitive factors underlying altruistic cheating and self-serving cheating.

Study 1

The first study focuses on developing and validating the newly proposed method. In this study, researchers examined the validity of the method by comparing its results with the results of other behavioral games. The method was then used to reexamine the relationship between cheating and sensation-seeking.

Convergent Validity and the Mind Game

Convergent validity refers to the correlation between two measures that are expected to evaluate the same construct (Cunningham, Preacher, & Banaji, 2001; Carlson & Herdman, 2012). A high correlation between two measures indicates that they tap into an identical construct (Nunnally, 1967; Carlson & Herdman, 2012). The current study adapted the concept of convergent validity to investigate whether cheating individuals identified by the newly proposed method behave similarly in other behavioral games. Specifically, the researchers looked at

whether the "cheaters" identified by the new method would be more likely to cheat in the mind game as well.

As previously discussed, the mind game is a recently invented behavioral game that belongs to the category of non-strategic "cheating games", where participants have the opportunity to cheat by misreporting information that only they have access to (Kajackaite & Gneezy, 2017). In the mind game, participants can get a bonus if the number they roll on a die is the same as the number they have in mind. Past research shows that the mind game effectively assuages participants' fear of being caught cheating (Kajackaite & Gneezy, 2017). Meanwhile, the tendency to cheat in the mind game is also reflective of people's likelihood to cheat in the field. For instance, a modified version of the mind game that used shuffled cards instead of a die revealed that participants who received higher payoffs, which is indicative of a higher plausibility of cheating, were also more likely to keep the excessive payment that researchers "inadvertently" transferred to their accounts (Potters & Stoop, 2016).

Since the mind game served as a considerably accurate indicator of people's behavioral tendency to cheat, the current study employed it to validate whether the new method could successfully identify people's cheating tendency. It was hypothesized that cheaters identified by the current method would also be more likely to cheat in the mind game.

Personalities and Cheating

The method was used to reevaluate results of a previous study that investigated the relationship between cheating and sensation-seeking. Moreover, it was also used to explore the relationship between cheating and several other personality factors that might be correlated with the tendency to engage in unethical behaviors.

Sensation Seeking. Sensation seeking is defined as "the need for varied, novel, and complex sensations and experiences, and the willingness to take physical and social risks for the sake of such experience" (Zuckerman, 1979). Past research indicated that this need is associated with gambling addiction (Mehroof & Griffiths, 2010), drug use (Satinder & Black, 1984), and alcohol consumption (Schwarz, Burkhart & Green, 1978).

As previously discussed, a study that investigated the relationship between sensation-seeking and cheating suggested a positive correlation between the two (DeAndrea, Carpenter, Shulman, & Levine, 2009). However, the design of the experiment generated a relatively high concern of being caught cheating. As a result, participants who were in the lower spectrum of risk-taking and sensation-seeking might be reluctant to violate the rules, even if they had the tendency to do so in daily life, where the probability of being caught is lower. Consequently, the heterogenous effect of study design makes it challenging to compare the cheating tendency of people who are low and high in sensation-seeking.

The current study aimed to reevaluate the relationship between cheating and sensation-seeking. It was hypothesized that there would be a weak positive or non-significant correlation between cheating and sensation-seeking. Since previous studies might have overestimated the relationship between cheating and sensation-seeking, the correlation identified in the current study was hypothesized to be smaller than that noted in a similar, previous study, which was around .22 (DeAndrea, Carpenter, Shulman, & Levine, 2009).

Method

Participants

Participants were recruited from Amazon Mechanical Turk. A total of 544 participants took part in the study at the first time point. Overall, most of the participants were male (57.4%)

and were white (67.1%). After giving consent to the study, MTurk participants were directed to Qualtrics to complete the study. All participants were paid with $1.50 for their participation. They also had the opportunity to earn a $0.50 bonus based on their performance in the mind game.

Participants were recontacted three weeks later to participate in a follow-up study. A total of 438 (80.5%) participants returned to the study and they did not differ significantly from the time 1 participants in terms of their demographic variables. Participants were paid $2.50 for their participation and had the opportunity to earn a $1 bonus based on their performance on a cognitive test.

Materials and Procedure

Surveys. Participants were asked to complete a demographic survey, personality scales, and two cognitive ability assessments (See Appendix A–C).

Measure of Sensation Seeking. The questionnaire was designed by Hoyle et al. (2002). The questionnaire contains 8 items in total and was used to evaluate individuals' sensation seeking in the domain of thrill and adventure seeking, experience seeking, boredom susceptibility, and disinhibition. Participants used a five-point Likert scale to indicate the degree to which they agree with each of the item. The final score was calculated by taking the mean of all items. The measure strongly correlated with behaviors related to drug use and other risky behaviors (Essau, C. A., Sasagawa, S., & Frick, P. J., 2006; Brown, J. D., & L'Engle, K. L.,2009). In the current study, the measure had a Cronbach alpha of 0.83, suggesting relatively high reliability.

Measure of Momentary Impulsivity. The questionnaire was originally created by Tomko, et al. (2014). The questionnaire was intended to measure individuals' impulsivity level in daily scenarios. It contains 4 items in total and participants rated the items using a Likert scale ranges from 1 (very slightly or not at all) to 5 (extremely). The final score was calculated by taking the mean of all items. The measure had a satisfactory level of reliability in the current study (Cronbach alpha = 0.71).

Measure of Religiosity. The questionnaire, invented by Lewis and Bates (2013), was a short scale used to measure participants' level of religiosity. The scale contains three items in total, and participants rated the degree to which they agreed with each statement on a scale from 1(not at all) to 4 (very). In the current study, the measure had a Cronbach alpha of 0.97, indicating very high reliability.

HEXACO-60 Subscale of Honesty-Humility. This questionnaire designed by Ashton and Lee (2009) measures the HEXACO personalities, which include Honesty-Humility, Emotionality, Extraversion, Agreeableness, Conscientiousness, and Openness to Experience. Only the Honesty-Humility subscale was used in the current study. The subscale contains 10 questions in total. Participants rated the degree to which they agree with each item using a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Item 14, 16, 17, 19, 20, and 22 were reverse-coded. The final score was the mean of all items. The scale had a Cronbach alpha of 0.83 in the current study, suggesting relatively high reliability.

Cognitive Ability Assessment I

Method description. As discussed, an ideal way to identify cheaters would be to directly identify the inconsistency between the *reported state* and the *true state* in a controlled setting. In the current study, two questions were used to obtain information on participants' *true* and

reported state. These two questions assess participants' knowledge about the same subject, so the underlying true response to these two questions is expected to be consistent. Participants were also given the opportunity to cheat on one of the questions. In this way, an inconsistency between the answers to these two questions suggests potential cheating behaviors.

Specifically, participants were asked to complete two self-report multiple choice questions (MCQs). The first question instructed participants to select the answer directly, and the answer was then graded by a computer. The second question instructed participants to think about the answer without writing it down; participants then proceeded to the next page to check the correct answer and self-report their accuracy. A monetary incentive was awarded for a correct answer. In this way, participants were incentivized to cheat by misreporting their answer to the second question.

Assumptions central to the analyses will be discussed. For assumption checking purposes, a control group was added to the design. The control group completed the second question in the same format as the first question (computer-graded MCQ), while the other participants (referred to as the study group) self-graded their answer to the second question.

Choice of Questions. For the method to be effective, one core requirement was that the two questions used to measure the *true* and the *reported state* test the same concept. Moreover, the method's intention should be inconspicuous, as participants may be hesitant to misreport in the second question if they realize that the researchers can detect cheating.

To fulfill the requirements, the concept of the conjunction fallacy was used to construct the questions. The conjunction rule states that the probability of two events co-occurring does not exceed the probability of these two events occurring separately. The conjunction fallacy refers to people's tendency to violate this rule due to intuitive reasoning (Tversky & Kahneman,

1983). Most people who fall prey to the fallacy are unaware of it and tend to make the mistake consistently (Tversky & Kahneman, 1983). Because of people's tendency to give consistent answers, the fallacy can be used to construct questions that measure the same concept.

Two conjunction fallacy questions were framed in distinct ways and used separately at two time points to collect the *true* and the *reported response* (See Appendix B–C). There was a time interval of three weeks between the two assessments. This design prevents participants from realizing that the two questions test the same concept, so that their answer to the first question would not affect their decision regarding whether to lie about their answer to the second question.

Procedure

Data were collected at two time points. At the first time point, all participants completed the demographic survey, personality scales, and a five-item MCQ cognitive assessment that contains a conjunction fallacy question (CFQ1) and four filler questions for attention checking. Participants then completed the mind game, where they had the opportunity to earn a $0.50 bonus.

Three weeks later, the same participants were contacted again to complete another questionnaire. Returning participants were randomly assigned to the control group, the self-serving cheating group, or the altruistic cheating group. Only the control group and the self-serving group were central to study 1's analysis and would be discussed here. Both groups completed an MCQ cognitive assessment that contains another conjunction fallacy question (CFQ2) and four filler questions. While the control group directly reported their answers, the self-serving cheating group self-reported their accuracy based on the answer key provided. Participants in both groups were told that an accuracy rate of 100% will result in a bonus of $1.

Notation (reference from Blair & Imai, 2012)

Suppose we got a simple random sample of size N from the population. We had N_0 participants assigned to the control group and N_1 participants assigned to the study group. Let Z_{ij} (t) be a binary variable indicating respondent i's answer to the j^{th} question, with $j \in \{1,2\}$. The notation t indicates whether the participant was assigned to the control group or the study group, which indicates whether they were given the opportunity to cheat; $t \in \{0,1\}$. For instance, an outcome notation $Z_{i,2}(1)=1$ indicates that a study group participant i reported getting the second question right.

Since the questions were answered by means of self-reports, all responses are regarded as participants' *reported responses.* Let Z^*_{ij} indicate the *true response* of participant i to the j^{th} question.

Assumptions

Assumption 1. *(No Defiers).* For each i = 1,...N, we assume that without the incentive or the ability to cheat, individuals did not intentionally write down an answer that differs from their *true response*. There was no incentive for participants to cheat in the first question. For the second question, although there was a monetary incentive, the control group participants did not have the ability to cheat, because their answers were graded by a computer. Therefore, all participants' answers to the first question reflect their *true response,* and the control group's answers to the second question are also their *true response.* That is:

$$Z_{i1}(0) = Z^*_{i1} \text{ for each } i=1,\ldots N$$

$$Z_{i2}(0) = Z^*_{i2} \text{ for each } I =1,\ldots N_0$$

Assumption 2. *(No Under-reporters).* For each i = 1,...N_1, we assume:

$$Z_{i2}(1) \geq Z^*_{i2}$$

This assumption states that participant i in the study group did not intentionally report having an incorrect answer to the second question when they actually had a correct answer. This assumption is reasonable, as the participants were given a bonus if they report getting the question right.

Assumption 3 *. *(Consistency)*. For each i = 1,...N, we assume:

$$Z^*_{i1} = Z^*_{i2}$$

This assumption states that participant i's *true response* to the first and second questions should be consistently correct or incorrect. This assumption allows us to predict the study group's *true response* to the second question (Z^*_{i2}) based on their response to the first question (which equals Z^*_{i1} because of A1). If an inconsistency was found between a study group participant i's *reported response* ($Z_{i2}(1)$) and the predicted *true response* (Z^*_{i2}), it is highly likely that this participant was lying. However, it may be too stringent to assume a perfect correlation between the answers to these two questions, as a variety of environmental factors could inadvertently cause inconsistencies. Thus, this assumption was relaxed and will be addressed in the following logistic regressions section.

Logistic Regression

As discussed, one potential caveat of the first method is that the assumption of consistency could be violated. Therefore, logistic regressions were employed to address this caveat.

Firstly, it is important to note that the proposed method is only able to identify potential cheating in participants who answered CFQ1 incorrectly. For participants who answer CFQ1

right, the researchers had no knowledge of their likelihood to lie. Therefore, the analysis focused only on the subset that answered CFQ1 wrong.

In a logistic regression, the control group's responses to CFQ2 (Z^*_{i2} by A1) was regressed on the demographic variable of personality factor of interest (e.g. sex). The results were then used to estimate the predicted true responses of the study groups ($\hat{Z}^*_{i2}$) had they not been given the chance to cheat in CFQ2. The predicted true results were then plotted against the demographic or personality variable of interest, along with the reported responses ($\hat{Z}_{i2}$) of the study groups. The difference between the predicted reported response and the predicted true response was calculated at each level of independent variables of interest ($\hat{Z}_{i2} - \hat{Z}^*_{i2} \mid X = x$) to indicate participants' cheating tendency at the specific level. For binary independent variables, the cheating tendency at the two levels were directly compared (e.g. compare $\hat{Z}_{i2} - \hat{Z}^*_{i2} \mid X = 1$ with $\hat{Z}_{i2} - \hat{Z}^*_{i2} \mid X = 0$). For continuous variables, a weighted average partial derivative value was calculated. Specifically, the difference in the cheating tendency of two adjacent levels was calculated (e.g. $(\hat{Z}_{i2} - \hat{Z}^*_{i2} \mid X = 5) - (\hat{Z}_{i2} - \hat{Z}^*_{i2} \mid X = 4)$). The difference was then weighted by the proportion of participants in the higher level of these two adjacent levels (e.g. following the previous example, the difference would be weighted by the proportion of X = 5). This rule was applied to all levels to calculate a weighted APD.

Since continuous variables such as the sensation-seeking score were averages of participants' responses to multiple items, there were many levels for each variable (e.g. a level of 1.125, 1.25, or1.375) and very few data points at each level. Therefore, the variables were recoded to increase the number of data points at each level. Specifically, a continuous variable with a response scale ranging from one to five was recoded into a categorical variable with five levels. See Appendix D for more details.

For both binary and categorical variables, bootstrapping of 1000 samples with replacement was used for inferential test. A percentile confidence interval was calculated at the level of alpha = .05.

Results

Attention Check

At the first and the second time point, four fillers questions were included in each of the cognitive tests. These questions were also used for attention checking. Since the questions are relatively easy, it was expected that participants should be able to get most of them correct. Participants who failed to answer more than two out of four attention check questions at the first time point were removed from the analysis. At the second time point, control group participants who failed to answer more than two out of four attention check questions were removed; this criterion was not applied to participants who were assigned to the self-serving cheating group and the altruistic cheating group as they self-reported their accuracy of the attention-checking questions. A total of four participants were removed because of failure to complete the attention check.

Missing Values

Only a few data points were missing for study variables. An evaluation showed that these data were missing completely at random. Therefore, the missing values were substituted with the mean value of the variables.

Attrition Patterns and Balance Test

In the current study, the random treatment assignment only took place at the second time point. Therefore, there is no reason to expect that the treatment assignment induced differential

attrition patterns when people took part in the first study. Furthermore, a balance test showed that all demographic variables were distributed evenly across groups at the second time point (See Table 1 for the distribution of demographic variables and balance test results).

Additional Data Collection

During the administration of the follow-up survey, an error occurred to the wording of the survey. At the second time point, the first 107 participants who were randomly assigned to the control group received a version where the options for CFQ2 were identical to each other. Specifically, the two options they were provided to choose from were both worded as “Tom is a high school math teacher”, while one of these options should be “Tom is a high school math teacher and an active volunteer at the local zoo”. As a result, their answers did not reflect their true responses. This error was found during the data collection process and was immediately fixed. The following 45 participants who were assigned to the control group took the correct version.

In order to maintain a relatively large sample size, the researchers recontacted the 107 participants who took the wrong version and sent them an additional survey. The survey contained the correct version of the cognitive test that should have been administered in the previous follow-up survey. Participants could receive an additional $0.50 compensation by completing this five-question survey. Fifty-six participants came back to take the survey.

One potential concern was that participants who retook the cognitive test might focus harder on the questions, leading them to be more likely to answer CFQ2 correctly. To evaluate this, the researcher compared the accuracy rate of these 56 participants and the other 45 participants who received the right version of cognitive test when they took the follow-up survey. A two sample Z-test showed that even though participants who retook the cognitive test

were slightly more likely to get CFQ2 correct (62.5%) than those who took it for only one time (53.3%), the difference was not statistically significant ($p > .05$). Therefore, the data of these 56 participants were included in subsequent analyses.

Method Evaluation

Overall Descriptives. Since the study was only interested in looking at people who answered CFQ1 incorrectly, a subset of the sample was taken for analysis. Overall, 66.0% of the sample answered the CFQ1 incorrectly. Of the subset sample that the current study focused on, the majority of the participants were male (55.2%). Participants were mostly distributed evenly across the age range of 23-34 (30.2%), 35-44 (34.5%) and 44 or more (34.5%). Even though these participants came from a diverse ethnic background, they were predominantly white (69%) or Asian/Pacific Islander (19.4%). Within the sample, 59.5% of the participants had a bachelor's degree or higher. Participants held a wide range of political affiliations, with most of them identifying themselves as democrat (49.6%). See Table 1 for more details of the distribution of demographic variables.

A balance test was conducted on the subset to check whether chance imbalance occurred across group. The results showed that all demographic variables were distributed evenly across groups (See Table 1).

Overall Tendency to Cheat. Bootstrapping of 1000 samples showed that overall, there was a considerable gap between what participants true accuracy rate of CFQ2 and their reported accuracy rate of CFQ2. Specifically, for participants who were given the chance to self-report, their accuracy rate of CFQ2 was 55.8% higher than the rate of participants who were computer-graded ($M_{true} = 0.18$, $M_{reported} = 0.74$). Bootstrapping showed that this difference was significant (95% CI = [0.43, 0.68]).

Sex and Cheating. Overall, female and male participants were very similar in their *true* probability of getting CFQ2 correctly. At the same time, male participants were slightly more likely to *self-report* getting CFQ2 correctly (See Figure 1). A bootstrapping of 1000 samples showed that on average, 19.1% of male participants and 18.2% of female participants got CFQ2 correct; there was no significant difference between sex (95% CI = [-0.177, 0.198]). Meanwhile, 76.8% and 72.6% of male and female participants, respectively, self-reported getting CFQ2 correct; the difference was not significant (95% CI = [-0.136, 0.224]).

On average, male participants were around 3.2% more likely than female participants to cheat. However, the percentile interval with 95% coverage showed that this difference was not significant (95% CI = [-0.234, 0.282]).

Age and Cheating. When asking to the report true response to CFQ2, participants who were older were slightly less likely to answer the question right. Bootstrapping with 1000 samples indicated that the average weighted APD was -0.012, which was not statistically significant (95% CI = [-0.15, 0.09]). Meanwhile, older participants were more likely to self-report getting the question right. Bootstrapping gave an average weighted APD of 0.05, which was not statistically significant (95% CI = [-0.04, 0.16]).

As shown in Figure 2, the gap between what participants claimed to get and what they actually get for CFQ2 was wider for older participants. However, positive correlation between age and the likelihood to cheat was not significant. ($M_{\text{weight APD}} = 0.06$, 95% CI = [-0.07, 0.23]).

Education and Cheating. Participants with a bachelor's degree or higher were more likely to answer CFQ2 right than participants who have some college, high school or less, but bootstrapping with 1000 samples showed that this difference is not statistically significant ($M_{\text{edu.high}} = 23.7\%$, $M_{\text{edu.low}} = 11.5\%$, 95% CI = [-0.064, 0.304]). Participants with higher

education levels were less likely to self-report getting CFQ2 correct, but the difference was also not significant at the level of .05 ($M_{edu.high}$ = 0.709, $M_{edu.low}$ = 0.80, 95% CI = [-0.269, 0.077]).

As shown in Figure 3, the gap between the reported and the true answer was wider for people with lower education levels. On average, participants with lower education levels were 21.37% more likely to cheat than participants with higher education levels. This difference was not significant at the level of .05 (95% CI = [-0.465, 0.041]).

Political Extremity and Cheating. As shown in Figure 4, the gap between the reported and the true response increased with political extremity. People with more extreme political attitudes (either democrat or republican) were less likely to answer CFQ2 correctly when they did not have the chance to cheat, but the difference was not significant ($M_{extreme}$ = 10.01%, $M_{non-extreme}$ = 25.94%, 95% CI = [-0.33, 0.02]). Meanwhile, participants with extreme political attitudes were more likely to self-report getting the question right. This difference was not significant ($M_{extreme}$ = 91.35%, $M_{non-extreme}$ = 70.02%, 95% CI = [-0.06, 0.27]).

Bootstrapping with 1000 samples showed that at the level of .05, there was a significant difference between the likelihood of cheating for people with different extremity of political attitudes. Specifically, people with extreme political attitudes were 27.2% more likely to cheat than people with non-extreme political attitudes (95% CI = [0.02, 0.51]).

Sensation-Seeking and Cheating. Overall, people with higher sensation-seeking score were less likely to get CFQ2 correct, but this difference was not significant based on the results from bootstrapping of 1000 samples ($M_{weighted\ APD}$ = -0.02, 95% CI = [-0.11, 0.05]). At the same time, people with higher sensation-seeking tendency were more likely to self-report getting CFQ2 correct when they had the opportunity to misreport. The results were not significant based on bootstrapping ($M_{weighted\ APD}$ = 0.06, 95% CI = [-0.04, 0.12]).

As the sensation-seeking score increased, the gap between participants' reported and true response also increased. However, results from bootstrapping with 1000 samples showed that this positive correlation between sensation-seeking and cheating was not significant ($M_{weighted\ APD}$ = 0.06, 95% CI = [-0.05, 0.18]). See Figure 5 fore more details.

Momentary Impulsivity and Cheating. Bootstrapping showed that participants with higher level of momentary impulsivity were significantly more likely to get CFQ2 correct (M weighted APD = 0.08, 95% CI = [0.01, 0.14]). Meanwhile, higher momentary impulsivity was associated with higher probability of reporting a correct CFQ2 answer, but the weighted APD for this associate was not significant ($M_{weighed\ APD}$ = 0.07, 95% CI = [-0.02, 0.17]).

There was not a significant difference between the gap between true and reported answer to CFQ2 for participants with varying level of momentary impulsivity ($M_{weighted\ APD}$ = -0.01, 95% CI = [-0.13, 0.12]). See Figure 6 for more details.

Religiosity and Cheating. As indicated by Figure 7, participants with different level of religiosity did not differ significantly in their tendency to get CFQ2 correct ($M_{weighed\ APD}$ = -0.002, 95% CI = [-0.04, 0.05]). Meanwhile, the figure showed that there is a negative association between religiosity and self-reported CFQ2 accuracy, but this association was not significant ($M_{weighted\ APD}$ = -0.03, 95% CI = [-0.08, 0.004]).

Bootstrapping with 1000 samples showed that participants with different levels of religiosity did not differ in their likelihood to cheat ($M_{weighted\ APD}$ = -0.03, 95% CI = [-0.09, 0.03]).

Honesty-Humility and Cheating. With increased self-reported honesty-humility scores, the gap between the true and reported answer to CFQ2 also increased. However, this trend was

not significant based on the results of bootstrappings ($M_{weighted\ APD}$ = -0.04, 95% CI = [-0.16, 0.09]). Based on Figure 8, participants with higher honesty-humility score seemed to be less likely to get CFQ2 right and self-report getting CFQ2 right, but these trends were not statistically significant ($M_{weighted\ APD\ t0}$ = -0.002, 95% CI = [-0.10, 0.09]; $M_{weighted\ APD\ t1}$ = -0.04, 95% CI = [-0.12, 0.05]).

Mind Game and Cheating. Overall, even though Figure 9 indicated that participants who said "yes" in the mind game (an indicator of potential cheating) seemed more likely to cheat in self-reported FQ2 as well, this trend was not significant (M_{diff} = 0.14, 95% CI = [-0.13, 0.4]).

Additional Analyses for Categorial Variables. In addition to the weighted APD, the researcher also conducted additional analyses to examine the relations between cheating and the categorical variables of interest. In the analyses, instead of calculating the average partial derivatives, the difference between the predicted reported response and the predicted true response was calculated at the lowest and highest level of independent variables of interest. The difference at the lowest level was then subtracted from the difference at the highest level (e.g., $(\hat{Z}_{i2} - \hat{Z}^*_{i2} \mid X = 5) - (\hat{Z}_{i2} - \hat{Z}^*_{i2} \mid X = 1)$). Bootstrapping of 1000 samples with replacement was then used to construct a percentile confidence interval. This method was then used to explore whether there might be a significant difference at the extreme ends. The results showed that the correlations were not significant for all variables at the alpha level of .05.

Discussion

Based on the figuress generated from logistic regressions, it could be seen that overall, the directions of the correlations between cheating and different independent variables were consistent with expectations. Specifically, participants with higher education levels were less likely to cheat; older participants were more likely to cheat; participants with higher political

extremity were more likely to cheat; participatns with higher sensation-seeking were more likely to cheat, participants with higher religiosity and higher honesty-humility score were less likely to cheat. Based on the figures, cheating did not seem to be highly correlated with gender, momentary impulsivity, and participants' answer to the mind game. However, for the plausible correlations identified, only the correlation between political extremity and cheating was significant.

One possible reason that the data revealed trends mostly consistent with expectations, but not at a significant level, could be a lack of variation in the levels of independent variabels. For instance, an examination of data distribution revealed that for personality traits such as sensation-seeking, most participants' answers clustered at the lower ends and only a few had responses at the level of 4 or 5. Similarily in the additional analyses for the categorical variables, the very limited number of sample at the two extreme ends could also account for the non-significant results. Having a larger sample size for every study condition would allow a more precise estimation at levels that had realtively few data points.

One unexpected finding worth noting is the relationship between cheating and momentary impulsivity. While the researchers hypothesized that there would be a positive correlation between cheating and momentary impulsivity, the graph showed no obvious change in the likelihood to cheat as the impulsivity score increased. One unexpected pattern found was that participants with higher impulsivity scores were also more likely to get CFQ2 correct (see the black line in Figure 6). A closer examination of the graph revealed an interesting observation: as the momentary impulsivity score increased, participants' likelihood of getting CFQ2 right approched 0.5, which indicates random guessing. It is therefore likely that participants with

higher level of impulsivity got more CFQ2 correct not because they were more likely to know the true answer, but because they were more likely to engage in random guessing.

Study 2

One advantage of the new method is that it allows researchers to study specific characteristics associated with cheating individuals. Therefore, in the second study, we will use the method to explore cognitive mechanisms and personality traits associated with a particular type of cheating: altruistic cheating, which refers to cheating for the purpose of benefiting others (Peleg, Hochman, Ayal, & Ariely, 2018).

Altruistic Cheating

Even though it is uncommon to relate unethical behaviors with prosocial causes, past inquiries repeatedly revealed that people are more willing to violate rules when their behaviors also benefit others (Gino, Ayal, & Ariely, 2013; Gino & Pierce, 2009, Wiltermuth, 2010; Gino & Pierce, 2010). Researchers proposed several theories to explain this seemingly inconsistent set of behaviors and circumstances. One proposition is that splitting the benefits with others helps one to alleviate the guilt brought by cheating (Wiltermuth, 2010). According to Mazar, Amir, and Ariely (2008), violations of rules create conflicts between self-interest and self-image. On the one hand, people have the motive to maximize gains by cheating; on the other hand, they want to perceive themselves as moral beings that act in accordance with the ethical rules. Building on this conflict, Wiltermuth (2010) proposed that people would be more willing to cheat if the benefits are split with a third-party, because the splitting makes them feel better about their moral self-image.

While some popular theories assumed that even when people cheat for others, their ultimate motive is to justify personal financial gains, research discovered that financial reward is not the single driver for altruistic behaviors. For instance, Gino and Pierce (2009) found that when there is an apparent disparity in wealth, people are willing to cheat, even at their own financial cost, to alleviate the mental distress brought by the inequality. Interestingly, past studies also showed that people would conduct unethical behaviors for the sole purpose of benefiting others. In a task that asked participants to solve math questions within a short period of time, researchers gave participants the opportunity to cheat by checking the answers (Gino, Ayal, & Ariely, 2013). The results indicated that while participants were most likely to cheat when both themselves and others could benefit, a large number of participants (88%) also cheated when it only brought additional benefits to others.

To further investigate the cognitive process behind cheating for others, Peleg, Hochman, Ayal and Ariely (2018) used a lie detector test to evaluate people's galvanic skin response after cheating. The study showed that when cheating resulted in financial benefits for social organizations instead of personal gain, participants were not only more likely to cheat, but also experienced less physiological distress caused by their unethical behaviors. One potential explanation offered was that once cheating is justified, people feel little guilt doing it and regard it as the right thing to do.

Even though recent studies shed light on the motives for altruistic cheating, the specific mechanisms behind it have not been thoroughly considered. The current study delved into this topic by comparing people's perception of their moral self-image before and after cheating to investigate whether altruistic cheating is associated with more positive self-perceptions.

Based on findings of previous research, it was hypothesized that compared to cheaters in the self-serving condition, cheaters in the altruistic condition would have a significant increase in the moral self-image score after cheating. However, it is important to stress that even though the present study employed random assignments, it did not aim to draw causal inferences regarding the relationship between cheating and self-perceived morality. Participants were not randomly assigned to cheat for themselves or others; instead, they were randomly assigned with *the opportunity* to do so. The study was only interested in investigating whether people experience different levels of change in self-perceived morality when they voluntarily choose to cheat for themselves versus for others.

Method

Participants

Participants were the same group of people who took part in study 1.

Materials and Procedure

Moral Self-image Scale (MSI). The questionnaire was designed by Jordan, Lelivel, and Tenbrunsel (2015). The questionnaire contains 9 items in total. Using a Likert scale that ranges from 1 (much less than the X person I want to be) to 9, (much less than the X person I want to be), participants rate how close they are to traits representative of a high morality level. An example would be “compared to the caring person I want to be, I am…”. The measure was demonstrated to possess sufficient convergent validity and divergent validity. In the current study, the measure has a Cronbach alpha of 0.89 at the first time point and a Cronbach alpha of 0.93 at the second time point, indicating high reliability. The differences between participants’ pre-test and post-test moral self-image scores were calculated to represent the change in MSI.

Procedure

At the first time point, participants completed a pre-test moral self-image questionnaire along with the first cognitive test and other questionnaires. At the second time point, participants were randomly assigned to a control group, a self-serving cheating group, or an altruistic cheating group. All participants completed a post-test moral self-image questionnaire after they finished the second cognitive test. While participants in the control group directly reported their answers, participants in the self-serving cheating group and the altruistic cheating group were asked to think about the answers but not to write it down. The two groups were then shown the answers and asked to self-report their accuracy. For all three groups, participants were promised a $1 bonus if they could get an accuracy rate of 100% in the second cognitive test. The researchers told the participants in the control group and the self-serving cheating group that this $1 bonus would be rewarded to them, while participants in the altruistic cheating group were told that this $1 bonus will be donated to a charity organization of their choice.

After completing the cognitive test, all participants completed a post-test self-morality questionnaire. Participants were then thanked for their help and given a survey code in order to be compensated on MTurk.

Results

Between-Group Difference in Cheating Tendency

Bootstrapping of 1000 samples showed that on average, around 55.77% of participants in the self-serving group cheated (95% CI = [0.43, 0.68]). Meanwhile, around 41.05% of participants in the altruistic group cheated (95% CI = [0.28, 0.54]). Participants in the self-

serving group were significantly more likely to cheat than participants in the altruistic cheating group (M_{diff} = 0.15, 95% CI = [0.01, 0.28]).

Moral Self-Image Change and Cheating

Figure 10 showed that for the self-serving group, there was no correlation between cheating and changes in moral self-image scores (MSI). For the altruistic group, the gap between reported accuracy and true accuracy became wider as the change in MSI increased, indicating a potentially positive correlation between cheating and change in MSI. However, bootstrapping of 1000 samples showed that the average weighted APD for both treatment groups were not significant ($M_{weighted\ APD\ self\text{-}serving}$ = 0.03, 95% CI = [-0.07, 0.18]; $M_{weighted\ APD\ altruistic}$ = 0.04, 95% CI = [-0.11, 0.23]).

Exploratory Analysis of the Relationship Between Cheating and Political Extremity Across Groups. Study 1 found a significant relationship between cheating and political extremity when participants had the opportunity to cheat for self-gains. For exploratory purposes, the researchers investigated the relationship between altruistic cheating and political extremity. The analysis showed that while people who had more extreme political views were more likely to cheat for themselves, they were not significantly more likely to cheat for others ($M_{weighted\ APD}$ = 0.11, 95% CI = [-0.18, 0.48]).

Discussion

Between-group Differences in Cheating

Based on findings in the previous literature, the study predicted that participants in the altruistic group would be more likely to cheat than participants in the self-serving group. Contrary to the expectation, the current study found that more participants cheated in the self-

serving group. Differences in the study design of previous studies and the current study offered a plausible explanation for the contradictory findings. Specifcally, in the previous study done by Peleg, Hochman, Ayal and Ariely (2018), participants came into the lab to participate in the studies. Having researchers administering the tests in person might make participants more consciously aware of social desirability concerns, therefore leading participants to have a higher motivation to cheat for charity donations. Moreover, the presence of other people during the decision-making processes could also increases participants' awareness of others and make them more likely to act for a prosocial cause. In fact, previous field experiments show that the mere act of presenting people with the images of eyes could increase charity donations by 48% (Powell, Roberts, & Nettle, 2012).

In contrast, in the current study, participants completed the experiments online without the presence of the researchers. Consequently, the motivation to cheat for others was weaker and did not seem as appealing as the egocentric motivation in the self-serving group. To further investigate this, future research could look at whether presenting participants with images of eyes or priming them with the concept of "others" would lead to increased cheating in the altruistic group. Furthermore, differences in the nature of participants sample might also contribute to the diverged results. Since many professional MTurk workers view the study compensation as their income, they might view the compensations bonuses differently than participants who took part in a one-time lab study. MTurk workers might paid more attention to whether the compensation would go to their own pocket, while the lab participants had less pressure of earning the compensation as a part of their expected income. Future study could also investigate this plausible explanation by conducting the current study on a different online sample (e.g. Reddit) that does not expect to earn the compensation as a part of income.

Cheating and Change in MIS

The current study also aimed to investigate the cognitive mechanism behind altruistic cheating. It was hypothesized that participants who cheated for others would experience a higher increase in self-perceived morality, as measured by the Moral Self-Image. The results did not suggest a significant increase in MIS for participants in the altruistic group. This non-significant finding could also be potentially attributed to the absence of observers, who could play an important role in one's evaluations of self-image.

General Discussion

In the current studies, the researchers proposed a new method to identify individual cheaters and study cheating behaviors. Study 1 examined how well the method converged with existing behavioral games and used the method to investigate the relationship between cheating and demographic and personality variables. Even though results were mostly consistent with the expected directions, data analyses showed that only political extremity was significantly positively associated with the tendency to cheat; the negative association between education and cheating was significant at the marginal level. Study 2 aimed to investigate the cognitive mechanism behind altruistic cheating. The results revealed interesting findings that were contradictory with previous studies. While the previous literature suggested that people tend to cheat more when cheating leads to more charity donations, the current study revealed that the egocentric motivation serves as a more powerful driver for cheating than altruistic motivation. Meanwhile, participants who cheated for self-serving and altruistic reasons did not differ significantly in their change in self-perceived morality. These findings could be partially

attributed to the study settings, which were online self-administered surveys that did not involve the presence of others as previous research had.

Limitation

The study had several deficiencies that should be brought to attention. First, because of the nature of the proposed methods, only a portion of the sample was used for data analysis. Specifically, participants who answer CFQ1 correct were excluded from the analysis. This sample size shrunk further because of attrition and the assignment of returning participants into three separate groups. One concern related to this is that due to a relatively small sample size for each group, there might not be enough variation in some independent variables of interest. A replication project of the current study should extend the scale of the sample and reexamine the relationship between cheating and different demographic and personality variables. This limitation could also be improved by using questions that have lower accuracy rates than the that of the conjunction fallacy question. As a result, relatively fewer participants will be excluded from the analyses.

Secondly, the mistake that occurred during the data collection process could have also inadvertently affected to the results. Specifically, some of the returning participants received an incorrect version of the test. Even though these participants were recontacted to redo the questionnaire and analyses showed that their accuracy rate did not differ from the rate of participants who received the correct version, the act of redoing the questionnaire might still have influenced the results. It is also worth mentioning that though not significant, participants who redid the questionnaire had an accuracy rate that was 10% higher than those who did not redo it. This potential issue could be address in a replication project.

Implications

In social psychology and decision sciences, it is important to focus on exploring how trait and state factors influence people's behaviors. However, developing a valid measurement tool also plays a crucial role in generating sound research findings. The current study contributes to the development of rigorous methods for studying sensitive behaviors and attitudes. Even though not all the hypotheses were significant, the results shed a light on the potential relationship between cheating and various demographic and personality factors. With refinement and further investigation of the method's validity, the proposed method could be implemented in future research to further explore other questions related to cheating behaviors. For instance, the method would allow researchers to examine potentially enlightening interactions between personality factors and different treatment variables in experimental studies.

Future Direction

Replication studies with larger samples sizes should be conducted to address some of the limitations and to further validate the significant correlation between cheating and political extremity. Researchers could also implement questions other than the conjunction fallacy question to evaluate the method's reliability from different perspectives. Moreover, with support from replicable findings, future researchers could delve into the intriguing relationship between political extremity and cheating. Past studies have shown that the extremity of people's political ideologies, not the direction, serves as a determining factor of many behavioral patterns. For instance, for both political parties, how extreme people's views are determine their tendency to feel superior about their beliefs (Toner, Leary, Asher, & Jongman-Sereno, 2013), to believe in political conspiracy theories (Prooijen, Krouwel, & Pollet, 2015), and to derogate a larger number of societal groups (Prooijen, Krouwel, Boiten, & Eendebak, 2015). It would be potentially interesting to explore how political extremity is associated with lying or cheating

under more specific contexts, such as on social platforms that tend to cultivate attitude polarizations.

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Appendix A

Demographic survey

1.Please indicate your gender
a) male
b) female
c) other(s)

2.Please indicate your ethnicity
a)White
b)Hispanic or Latino
c)Black or African American
d)Native American or American Indian
e)Asian/Pacific Islander
f)Other(s)

3.Please indicate your level of education
a)Some college, high school, or less
b)Bachelor degree (BA, BS) or more

4.Please indicate your age
a)18-24 years old
b)25-34 years old
c)35-44 years old
d)44 or more

Appendix B
Questionnaire at Time 1

Please indicate the degree to which you agree with the following statements (rated on a scale from 1: strongly disagree to 5 strongly agree; the sequence of all questions will be randomized).

Measure of Momentary Impulsivity (Tomko, et al., 2014)
1.I said things without thinking.
2.I spent more money than I meant to.
3.I have felt impatient.
4.I made a "spur of the moment" decision.

Measure of Sensation Seeking (Stephenson, Hoyle, Palmgreen, & Slater, 2003)
5.I would like to explore strange places
6.I would like to take off on a trip with no pre-planned routes or timetables
7.I get restless when I spend too much time at home
8.I prefer friends who are excitingly unpredictable
9.I like to do frightening things
10.I would like to try bungee jumping
11.I like wild parties
12.I would love to have new and exciting experience, even if they are illegal

HEXACO-60 Subscale of Honesty-Humility (Ashton & Lee, 2009)
13.I wouldn't use flattery to get a raise or promotion at work, even if I thought it would succeed.
14.If I knew that I could never get caught, I would be willing to steal a million dollars.
15.Having a lot of money is not especially important to me.
16.I think that I am entitled to more respect than the average person is.
17.If I want something from someone, I will laugh at that person's worst jokes.
18.I would never accept a bribe, even if it were very large.
19.I would get a lot of pleasure from owning expensive luxury goods.
20.I want people to know that I am an important person of high status.
21.I wouldn't pretend to like someone just to get that person to do favors for me.
22.I'd be tempted to use counterfeit money, if I were sure I could get away with it.

Measure of Religiosity (Lewis & Bates, 2013)
Please indicate the degree to which you agree with the following statements (rated on a scale from 1:not at all to 5: very)
23.How religious are you?
24.How important is religion in your life?
25.How important is it for you – or would it be if you had children now – to send your children for religious or spiritual services or instruction?

Cognitive Ability Assessment I
1. Find the answer that best completes the analogy: Book is to Reading as Fork is to:
a)drawing
b)writing

c)stirring
d)eating

2. Which number should come next in the pattern?37, 34, 31, 28,
a)25
b)15
c)20
d)5

3. What number best completes the analogy: 8:4 as 10:
a)3
b)7
c)24
3)5

4. *(CFQ1) Linda is 31 years old, single, outspoken, and very bright. She majored in philosophy. As a student, she was deeply concerned with issues of discrimination and social justice, and also participated in anti-nuclear demonstrations.*
Which is more probable?
a)Linda is a bank teller
b)Linda is a bank teller and is active in the feminist movement

5. 3 x 2 + 1 = ?
a)7
b)2
c)10
d)13

The Mind Game
Q22 In the following game, please think of a number between 1-6.
The computer will randomly generate a number between 1-6 for you on the next page. If the number you have in mind is the same as the number appears on the screen, you can get a bonus of $1
Now, think of a number between 1-6
-I confirm that I have a number in mind and I'm ready to proceed
(participants proceed to the next page)
The randomly generated number is:
(a random number between 1-6 will appear)
Is this the number you had in mind?
a)yes
b)no

Appendix C
Questionnaire at Time 2

Cognitive Assessment II
Reference Group Instruction:
In the following section, you will complete a series of cognitive assessment question. If you are able to reach a accuracy rate of 100%, you will be able to get a $1 bonus.

Study Group Instruction:
In the following section, you will complete a series of cognitive assessment question. After seeing the question, please think of an answer to the question, but do not write down the answer. After confirming that you have an answer, you could proceed to the next page to check the answer key and report whether you get it right. If you are able to reach a accuracy rate of 100%, you will be able to get a $1 bonus in addition to your $2 compensation.

Which one of the four makes the best comparison? Brother is to sister as niece is to:

A. mother
B. daughter
C. uncle
D. nephew

Which one of the five is least like the other four?

A. cow
B. tiger
C. snake
D. cat
E. dog

If you rearrange the letters "BARBIT", you would have the name of a:

A. ocean
B. country
C. state
D. animal
E. city

9 x 4 - 10 =?

A.30
B.26
C.14
D.35
Tom studied computer science in college. He took a lot of math courses and he stayed at a lab to do research during weekends. However, Tom was also deeply intrigued by nature. One thing he

loved to do the most during college was visiting the botanical garden and taking pictures of plants. Which of the following is more probable?

A. Tom is a high school math teacher
B. Tom is a high school math teacher and an active volunteer at the local zoo

Appendix D
Recoding Rule

For a continuous variable with levels ranging from one to five, the following rule was applied to recode the continuous variable into a categorical variable:

If $0 \leq \text{score} < 1.5$: recoded into 1;

If $1.5 \leq \text{score} < 2.5$: recoded into 1;

If $2.5 \leq \text{score} < 3.5$: recoded into 1;

If $3.5 \leq \text{score} < 4.5$: recoded into 1;

If $4.5 \leq \text{score}$: recoded into 5.

Table 1

Demographics of Study Sample and Balance Test Results

	Time 1 Sample (n=544)	Subset Sample[1] (n=252)				
Variable	all	control	self-serving	altruistic	all	p-value [2]
Sex						
%Male	57.40%	57.80%	45.70%	45.70%	48.80%	>.05
Ethnicity						
%White	67.10%	76.60%	64.90%	68.10%	69.00%	>.05
%Hispanic/Latino	3.30%	1.60%	3.20%	4.30%	3.20%	
%Black/African American	6.80%	4.70%	6.40%	7.40%	6.30%	
%Native American/American Indian	0.90%	NA	1.10%	1.10%	0.80%	
%Asian/Pacific Islander	20.20%	17.20%	22.30%	18.10%	19.40%	
%Other	1.70%	NA	2.10%	1.10%	1.20%	
Education [3]						
%Some college, high school, or less	36%	40.60%	38.30%	36.20%	38.10%	>.05
%Bachelors degree or higher	62.70%	59.40%	59.60%	59.60%	59.50%	
Age						
%18-24	1.70%	NA	1.10%	1.10%	0.79%	>.05
%25-34	36.60%	25.00%	25.50%	38.30%	30.20%	
%35-44	34.60%	39.10%	36.20%	29.80%	34.50%	
%44 or more	27.20%	35.90%	37.20%	30.90%	34.50%	
Political Affiliation						
%Democrat	52.00%	58.80%	44.70%	48.90%	49.60%	>.05
%Independent	21.30%	14.10%	25.50%	25.50%	22.60%	
%Republican	26.70%	28.10%	29.80%	25.50%	27.80%	

[1] The subset sample includes participants who got CFQ2 wrong at the first time point, came back to take the follow-up study, and past the attention check successfully.

[2] The p-value is for the balance test of the distribution across groups.

[3] There are some missing values for the variable education, these missing values are substitue with the mean value because of MCAR. They are not included here.

Table 2

Cheating and Demographic Variables

Variables	Difference in Means	95% CI	Weighted APD	95% CI
Sex	0.032	[-0.234, 0.282]	--	--
Age	--	--	0.06	[-0.07, 0.23]
Education	--	--	0.214	[-0.465, 0.041]
Political Extremity	--	--	0.27	[0.02, 0.51]*

Table 3

Cheating and Personality Variables

Variables	Weighted APD	95% CI
Sensation-Seeking	0.06	[-0.05, 0.18]
Momentary Impulsivity	-0.01	[-0.13, 0.12]
Religiosity	-0.03	[-0.09, 0.03]
Honesty-Humility	-0.04	[-0.16, 0.09]

Figure Captions

Figure 1.

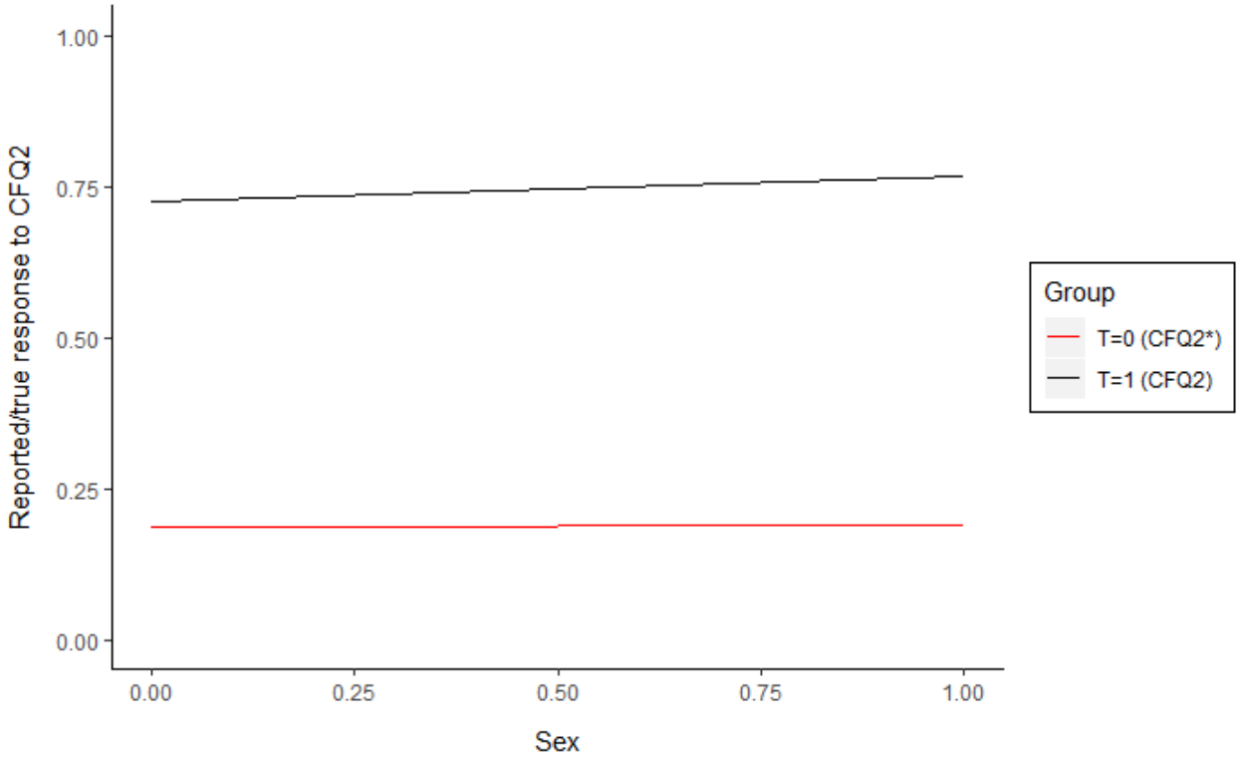

1.00
0.75
0.50
0.25
0.00
Reported/true response to CFQ2
0.00
0.25
0.50
0.75
1.00
Sex
Group
T=0 (CFQ2*)
T=1 (CFQ2)

Figure 2.

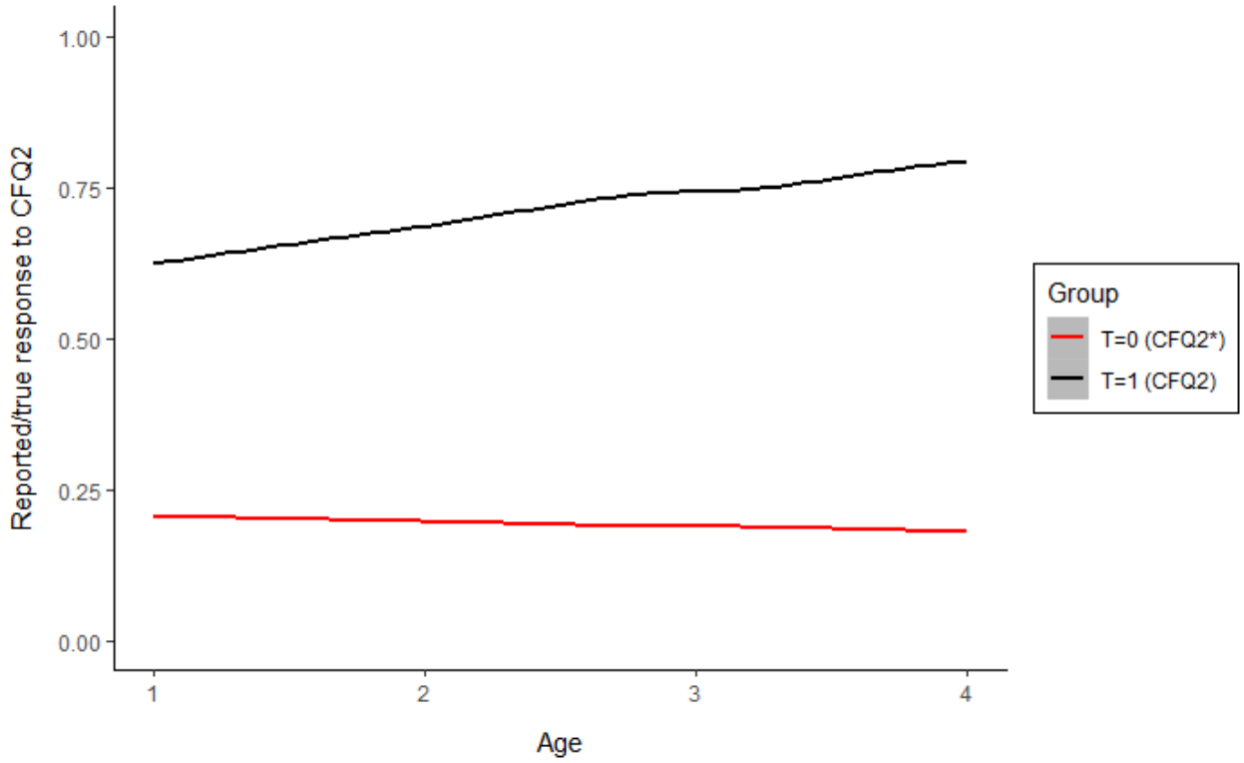
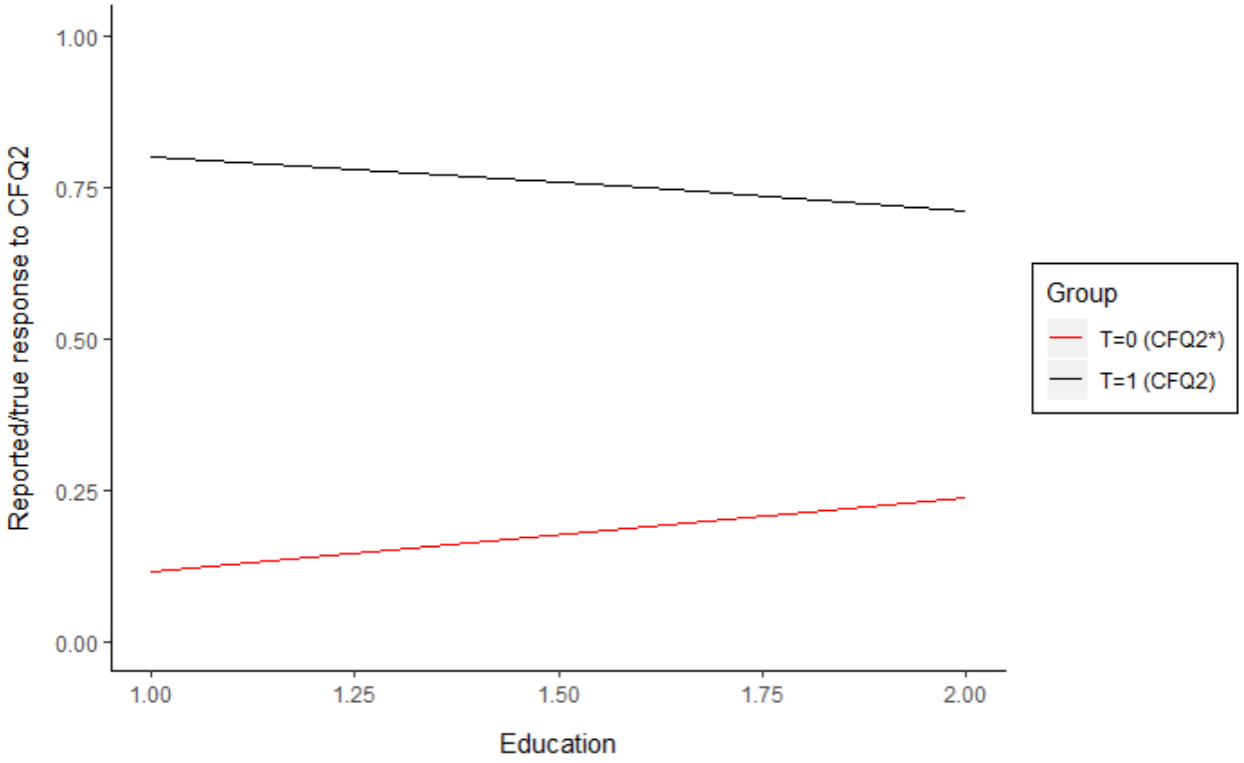

1.00
0.75
0.50
0.25
0.00
Reported/true response to CFQ2
1
2
3
4
Age
Group
T=0 (CFQ2*)
T=1 (CFQ2)

Figure 3.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0.50
0.25
0.00
Reported/true response to CFQ2
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1.25
1.50
1.75
2.00
Education
Group
T=0 (CFQ2*)
T=1 (CFQ2)

Figure 4.

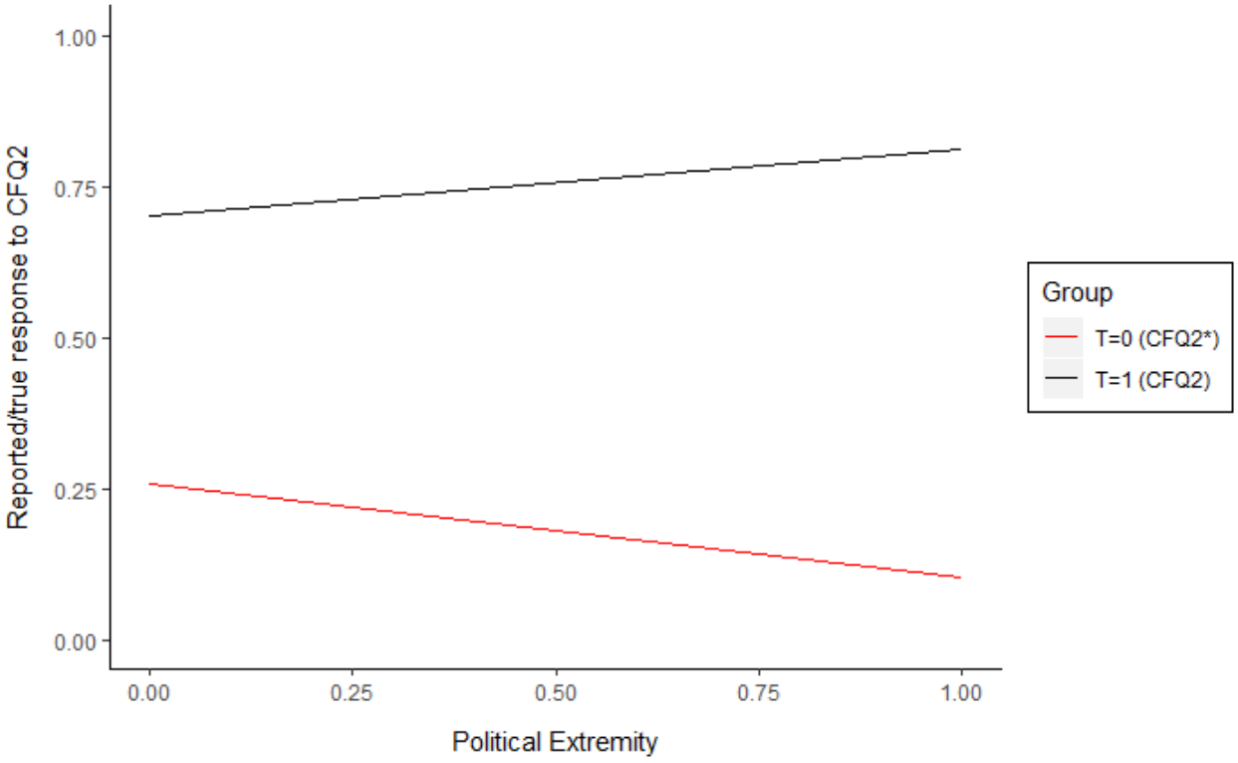

1.00
0.75
0.50
0.25
0.00
Reported/true response to CFQ2
0.00
0.25
0.50
0.75
1.00
Political Extremity
Group
T=0 (CFQ2*)
T=1 (CFQ2)

Figure 5.

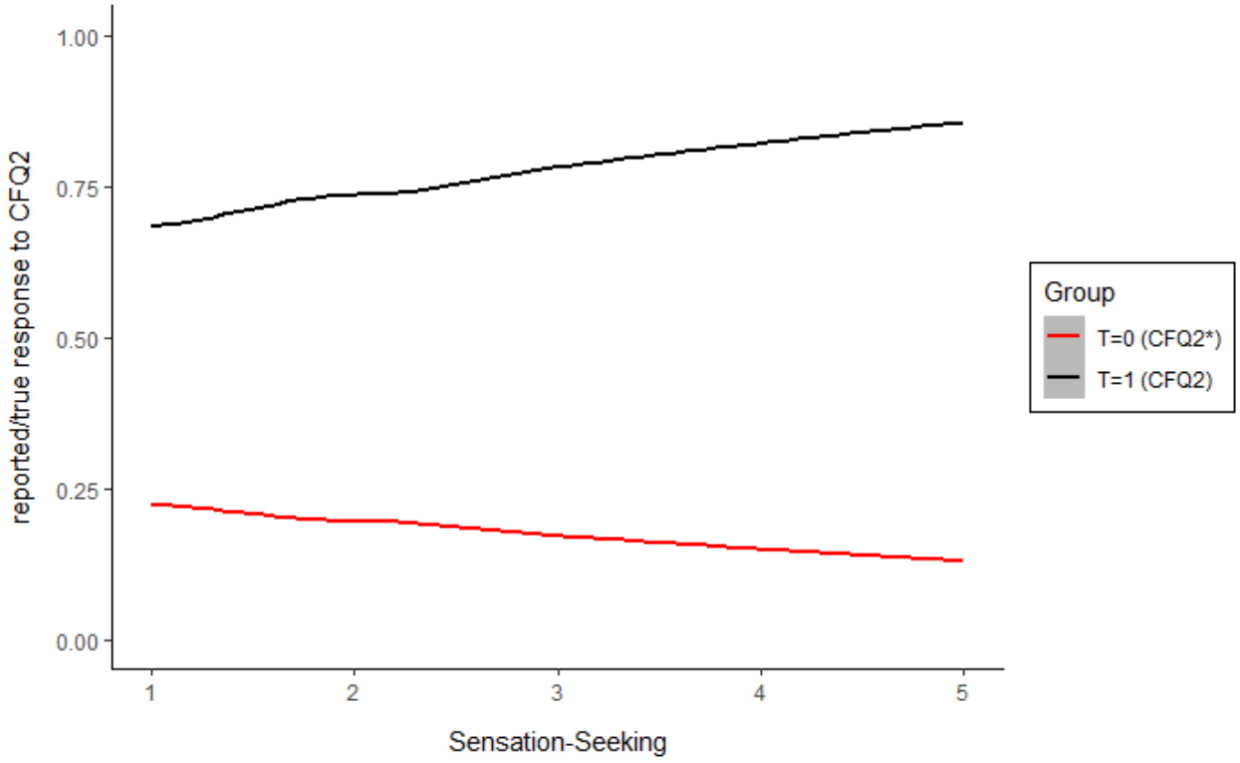
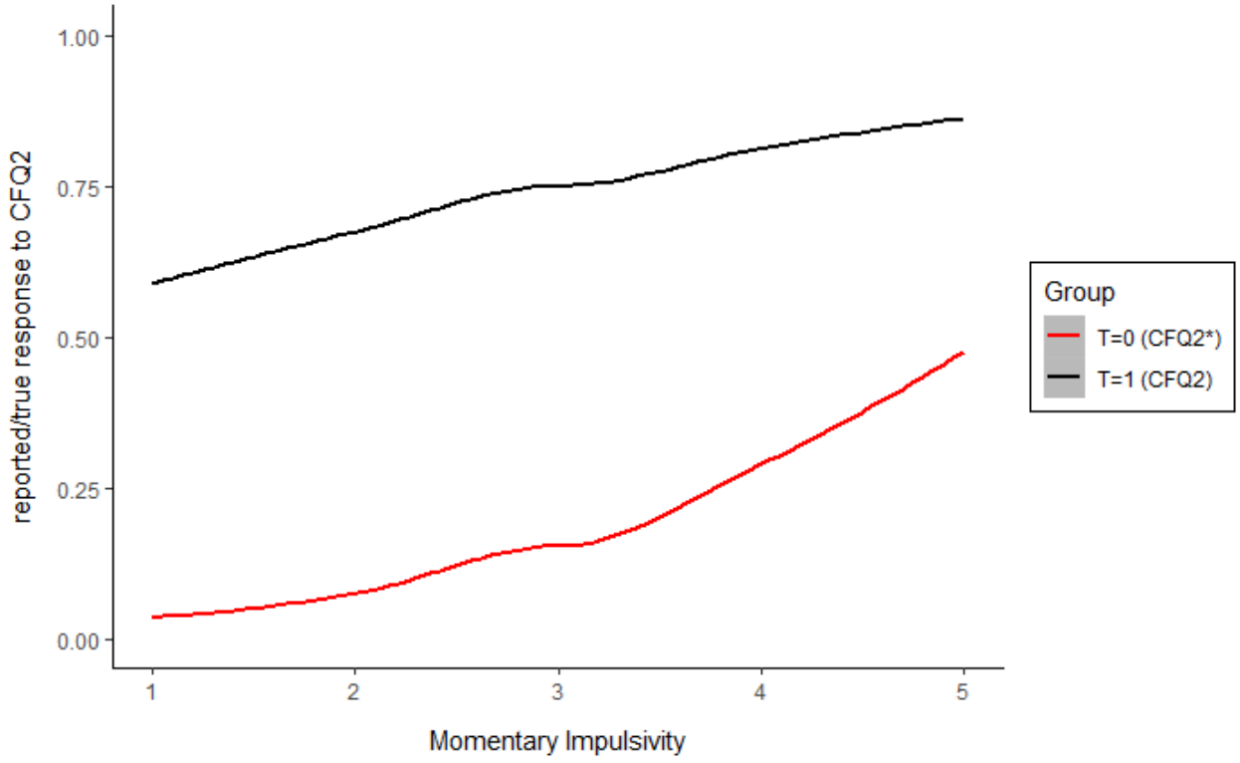

1.00
0.75
0.50
0.25
0.00
reported/true response to CFQ2
1
2
3
4
5
Sensation-Seeking
Group
T=0 (CFQ2*)
T=1 (CFQ2)

Figure 6.


1.00
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0.50
0.25
0.00
reported/true response to CFQ2
1
2
3
4
5
Momentary Impulsivity
Group
T=0 (CFQ2*)
T=1 (CFQ2)

Figure 7.

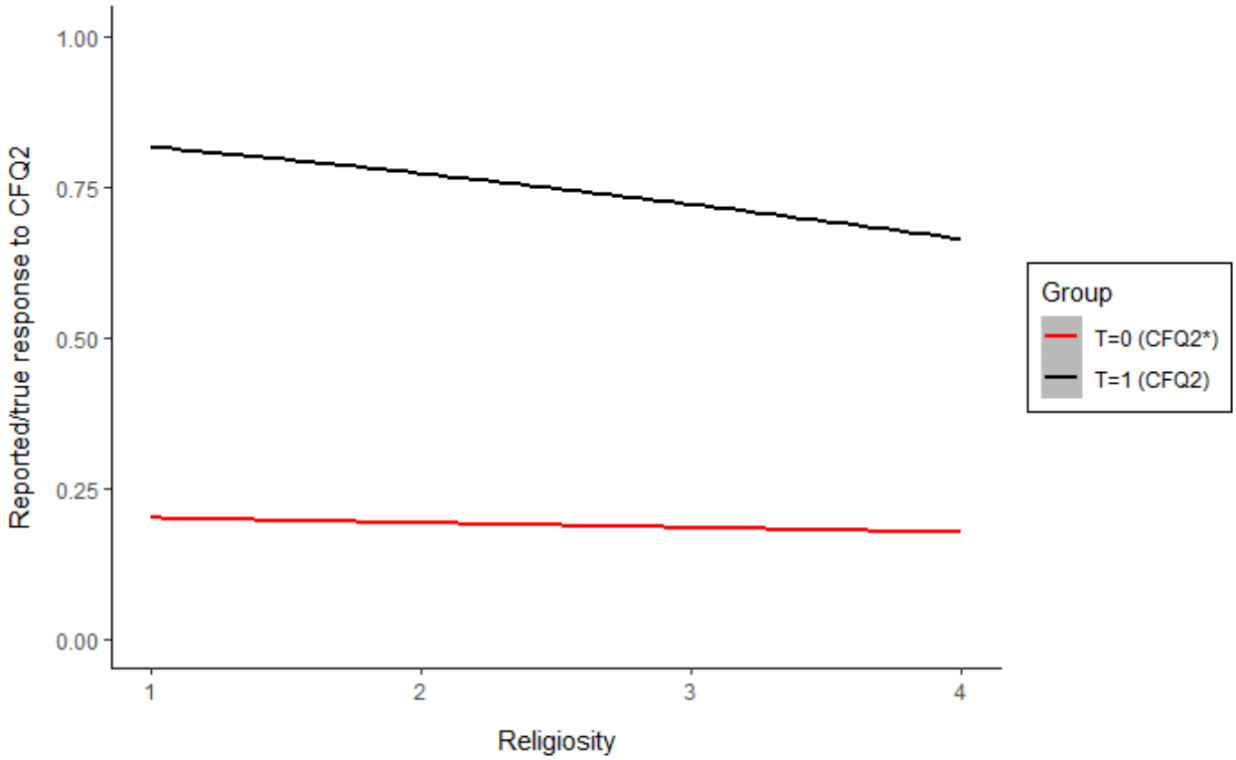
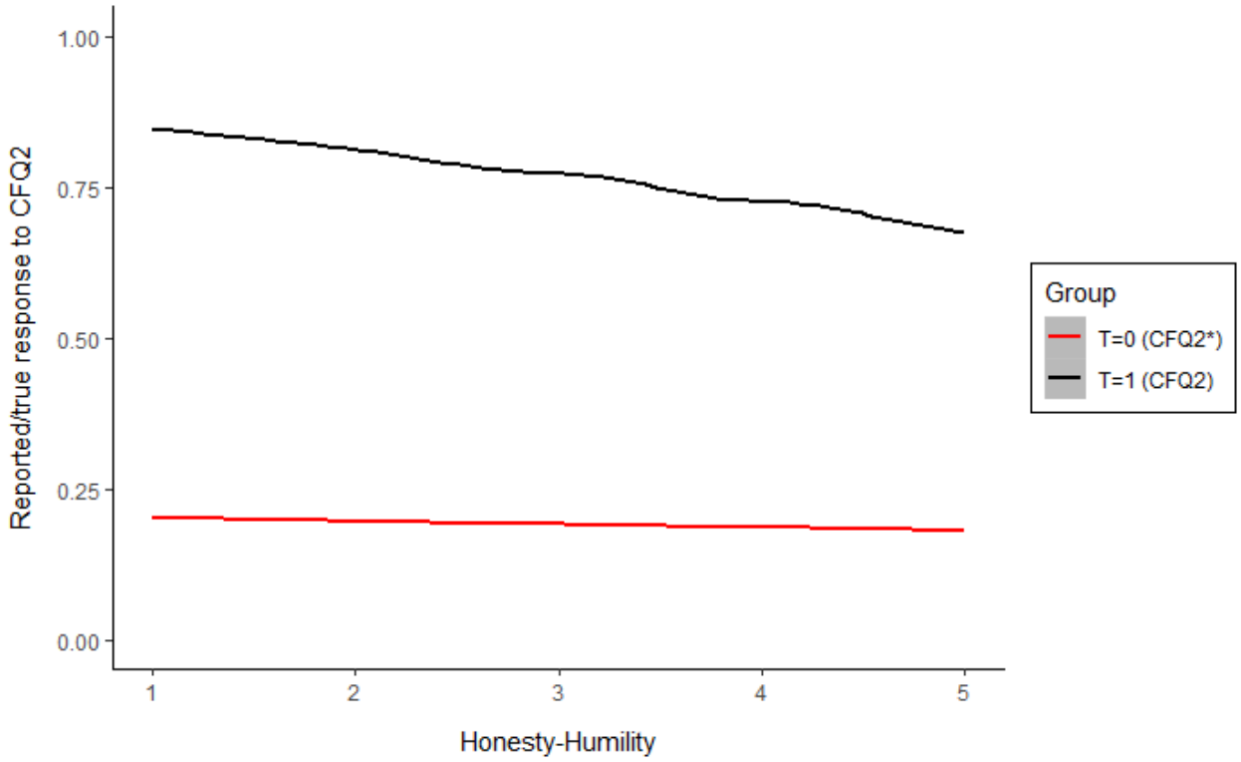

1.00
0.75
0.50
0.25
0.00
Reported/true response to CFQ2
1
2
3
4
Religiosity
Group
T=0 (CFQ2*)
T=1 (CFQ2)

Figure 8.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0.75
0.50
0.25
0.00
Reported/true response to CFQ2
1
2
3
4
5
Honesty-Humility
Group
T=0 (CFQ2*)
T=1 (CFQ2)

Figure 9.

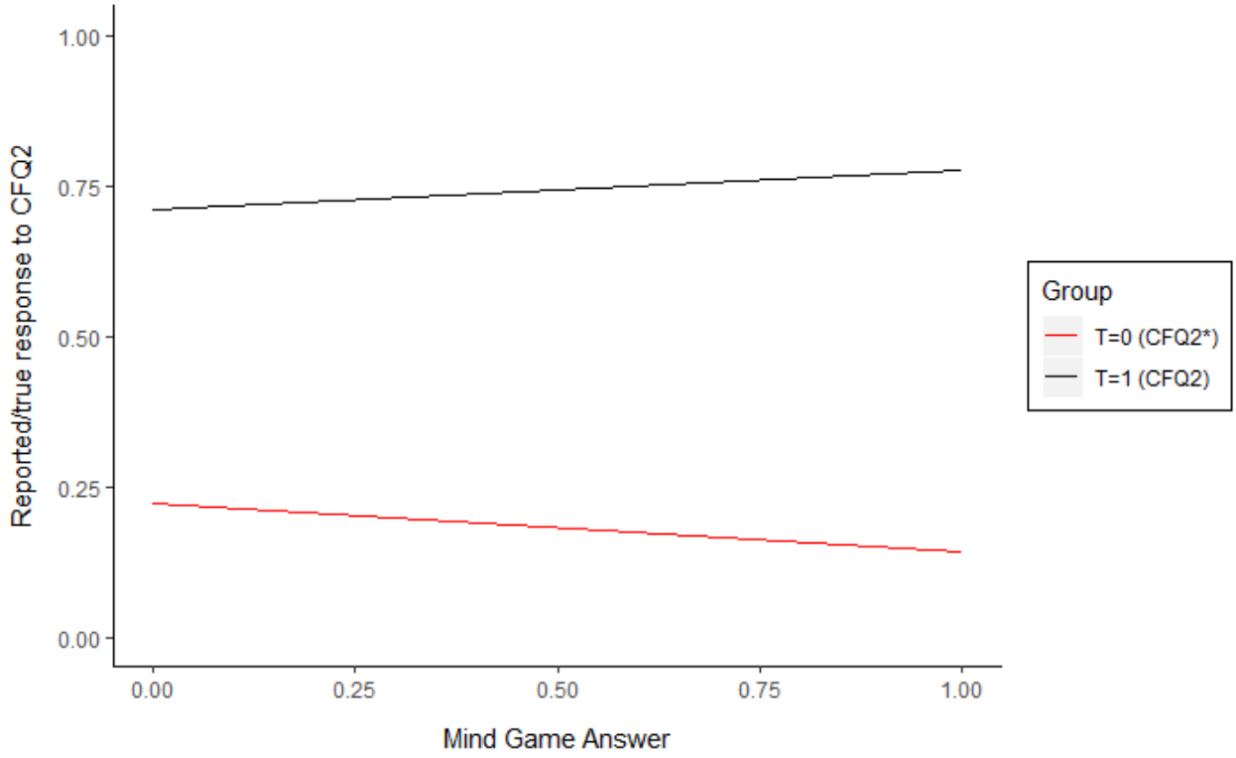
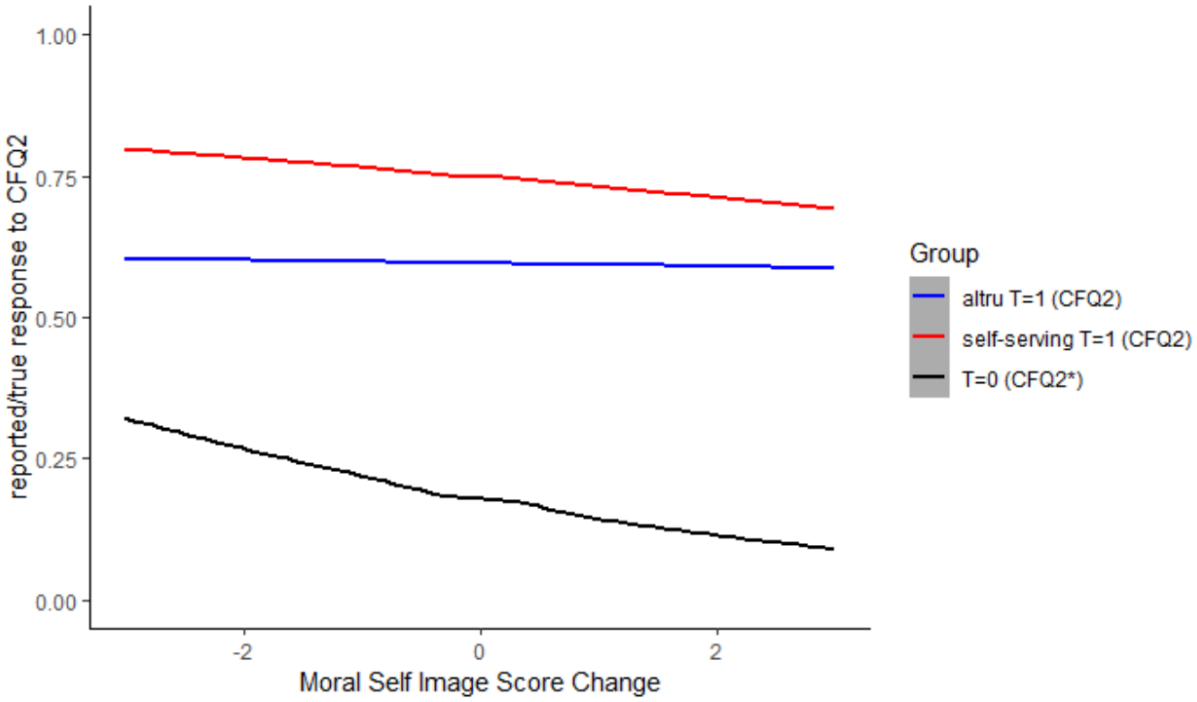

1.00
0.75
0.50
0.25
0.00
Reported/true response to CFQ2
0.00
0.25
0.50
0.75
1.00
Mind Game Answer
Group
T=0 (CFQ2*)
T=1 (CFQ2)

Figure 10.


1.00
0.75
0.50
0.25
0.00
reported/true response to CFQ2
-2
0
2
Moral Self Image Score Change
Group
altru T=1 (CFQ2)
self-serving T=1 (CFQ2)
T=0 (CFQ2*)