JESUS TAKE THE WHEEL?: PERCEPTIONS OF PERSONAL CONTROL AND BELIEF IN A CONTROLLING GOD

A Between-Subjects Replication of Compensatory Control Theory and Religious Beliefs using Economic Games and Autobiographical Recall

Abstract (253 words)

Compensatory Control Theory (CCT) states that perceptions of lowered personal control correlate with belief in external systems that establish structure. In this experiment, we studied this relationship by replicating Hoogeveen et al.'s 2018 study with the addition of two new treatments. Our primary research question was whether temporality of control affects belief in a controlling God. Our secondary research question was whether situational procedures are more effective than autobiographical recall tasks in inducing feelings of control.

We conducted an online experiment where participants were randomly assigned to one of four conditions: (1) *past, no-control;* (2) *past, in-control;* (3) *present, no-control;* and (4) *present, in-control.* Our *present* manipulation was through situational procedures, the Dictator Game for the in-control condition and Ultimatum Game for the no-control condition. Our primary outcome variable was belief in a controlling God. Our secondary outcome variable was perceived control after treatment exposure. We hypothesized firstly that perceptions of a lack of control in the present lead to an increased belief in the existence of a controlling God and secondly that situational procedures are more effective in inducing an increased or lowered sense of control as compared to autobiographical recall tasks.

Our results showed that none of the treatments had a significant effect on belief in a controlling God nor on self-reported feelings of control. Further research into CCT may increase our understanding of a wide range of socially relevant phenomena such as support for governments, belief in conspiracy theories, trust in medical authorities, and the strength of other authoritative systems.

Keywords: Compensatory Control Theory, Temporality, God, Religious Beliefs, Direct Replication, Economic Games

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I. Introduction (792 words)

Since the COVID-19 pandemic began, conspiracy theories have sprung up from various groups regarding the virus, the vaccine, and the pandemic. Examples include: "COVID-19 is a hoax" and "the government wants you to get the vaccine so that they can implant a microchip in your arm". Belief in these theories has led to harmful behavior—masses of people are unwilling to adhere to the policies put forth by governments, medical authorities, and the scientific establishment (Freeman et al., 2020).

One explanation for these problematic beliefs and resulting behavior can be found in Compensatory Control Theory (CCT), which assumes that people have an inherent need to view the world as controlled, structured, and orderly. The theory posits that when individuals experience a lack of personal control, they attempt to re-establish this view via secondary control (i.e., external sources of structure) (Rothbaum et al., 1982). Kay et al. (2008) ran six experiments within a larger study and found evidence in support of CCT—a lack of personal control manifested in increased support for socio-political systems or increased belief in the existence of a controlling God. In the case of the pandemic, beliefs in conspiracy theories act as a suitable compensatory control mechanism because other systems, such as governments, are unavailable due to their inadequate response (Stojanov et al., 2021).

Hoogeveen et al. (2018) replicated and extended Kay's seminal study, focusing on the experiments about CCT and beliefs in the existence of a controlling God. However, they found little evidence in support of this theory. The researchers concede that a possible reason for this replication failure is the fact that the autobiographical recall task they used to manipulate their independent variable (perceived personal control) was not successful (Hoogeveen et al., 2018). Research into the effectiveness of autobiographical recall on inducing emotions is also largely inconclusive; while some studies find support for its effectiveness (Siedlecka & Denson, 2019), others have reached opposing conclusions (Göritz & Moser, 2006).

Another gap we identified in their research was the effect of time on perceptions of control. The complexity of control has often been understudied, and existing theories of control tend to conceptualize it as a unidimensional construct. A dimension of control that is particularly understudied is temporality. In their replication, Hoogeveen et al. (2018) manipulated perceptions of control by asking participants to recall and write about an event that occurred in the past that made them feel in or out of control. However, according to Frazier et al. (2001), while perceptions of increased control over current and future aspects of an event are closely related to reducing distress, this is not true of perceptions of past control. Additional research also found the same—an increased sense of present control reduces stress, but perceptions of past or future

control are unrelated (Frazier et al., 2011). Our study aimed to add to this body of work by introducing temporality, specifically *present* conditions, in our treatments.

To explore these gaps, we conducted an experiment that replicated and extended the study by Hoogeveen et al. (2018). We manipulated control in the present and explored the effectiveness of using situational procedures instead of autobiographical recall tasks to induce perceptions of increased or reduced control via two economic games. We recruited participants using the Amazon Mechanical Turk (MTurk) platform and administered a survey via Qualtrics. Participants were randomly assigned into one of four conditions: *past, no-control*; *past, in-control*; *present, no-control*; and *present, in-control*. In the two *past* conditions, we replicated the original study by asking participants to recall and write about an event in the recent past that made them feel in or out of control (Hoogeveen et al., 2018). In our *present* conditions, participants played the Ultimatum Game for the *no-control* condition and the Dictator Game for the *in-control* condition. We tested two main hypotheses: (1) perceptions of a lack of control in the present will lead to an increased belief in the existence of a controlling God and (2) situational procedures (i.e., economic games) will be more effective in inducing an increased/lowered sense of control as compared to autobiographical recall tasks.

We did not find conclusive evidence to support that temporality of control affects belief in a controlling God by inducing a lack of control. We also found that our new primes were not effective—the economic games did not increase or lower the perceptions of control any more than the autobiographical recall task. Just as the replication study from Hoogeveen et al. (2018), our study did not produce significant results with the primes for feelings of control, including our extension's additional element of temporality.

The remainder of this paper will first briefly summarize literature around control, CCT, and economic games before detailing our study's methodology, results, limitations, and implications for future research.

II. Literature Review (1,035 words)

The following literature review provides context on the core concepts in our study, including Compensatory Control Theory, temporality, situational procedures, and economic games.

Compensatory Control Theory

Compensatory Control Theory (CCT) proposes that people have an innate need for control, specifically in perceiving that their life events are orderly and predictable. Research conducted by Rutjens & Kay (2016) provides support for CCT and posits that perceiving a lack of control is generally an aversive experience for people. This need is often filled by perceived personal control, which is a central construct in human

psychology. According to Bandura (2001), "among the mechanisms of personal agency, none is more central or pervasive than people's beliefs in their capability to exercise some measure of control over their own functioning and over environmental events".

However, what happens when that fails? According to CCT, when people perceive a lack of personal control over their life events, they look for alternatives to establish that sense of control. In doing so, they turn to external sources of control (Landau et al., 2015). This can refer to a wide variety of sources, including external structures (e.g., religious systems, governments, science) or a "powerful other" (e.g., God, a conspiracy theorist, Donald Trump) (Rothbaum et al., 1982).

Research on CCT centers around two external systems of control: (1) measuring people's beliefs in a controlling God and (2) measuring the degree to which people would prefer governmental control (Kay et al., 2008). Since then, CCT has extended to external systems such as spiritual beliefs (Kay et al., 2009), beliefs in paranormal abilities (Greenaway, Louis, & Hornsey, 2013), and beliefs in science (Rutjens et al., 2010).

Feelings of Control and Temporality

According to Frazier et al. (2001), the effects of perceived increased or reduced control depend on time. The researchers found that perceived present and future control tended to be positively associated with adjustment to stressful life events. However, perceived past control (i.e., perceptions of control over an event that has already occurred) was unrelated to stress (Frazier et al., 2001). In a follow-up study, they found similar results (Frazier et al., 2011). From this, we extrapolated that perceptions of a lack of control in the present versus the past will have differing effects on belief in a controlling God and designed our treatments as such.

Feelings of Control and Situational Procedures

Siedlecka & Denson (2019) conducted a qualitative review comparing different methods of inducing emotions in experimental settings. Two of the methods evaluated were autobiographical recall tasks and situational procedures. Autobiographical recall tasks use personal memories to reactivate emotions, and situational procedures mimic social situations to elicit target emotions. They found that both autobiographical recall tasks and situational procedures are effective in inducing a wide range of target emotions (Siedlecka & Denson, 2019). However, other studies have found contrasting results about autobiographical recall tasks (Göritz & Moser, 2006).

Prior research on CCT and control, in general, has used several external paradigms. While Kay's seminal study used an autobiographical recall task around a memory in which a participant felt like they did or did not have control (Kay et al., 2008), other studies have used exposure to images that were related to having control (De Arcos et al., 2005), a situational task that was unsolvable (Reed, Frasquillo, Colkin, Liemann, & Colbert, 2001), and a situational task in which another party was in control of the actions that the participant took (Maier & Seligman, 1976).

Given this conflicting evidence in the literature, and that the replication study found that the autobiographical recall task was not successful in inducing a lack of control (Hoogeveen et al., 2018), we are interested in exploring whether new situational procedures (i.e., the two economic games) will be comparatively more effective in the context of inducing control.

Feelings of Control and Economic Games

Our research team intended to induce feelings of having personal control (corresponding to the *present, in-control* treatment) versus not having personal control (corresponding to the *present, no-control* treatment) in the present through the use of a type of situational procedure—economic games. Specifically, we used the Ultimatum and Dictator Games. In the existing literature, these games have primarily been used to study trust, rationality, personal interest, bargaining behavior, and related topics. However, more recent studies have used them to induce feelings of control (Levav & Smeesters, 2011).

The Ultimatum Game is a two-player economic game (Güth, Schmittberger, & Schwarze, 1982). One player is the proposer and the other is the responder. The proposer is endowed with money, often $10, and told to decide how much money to offer the responder as a proposal (Thaler, 1988). The responder can either accept the offer, after which the total amount of money is allocated based on the proposal, or reject the offer, after which neither player receives any money (Krawczyk, 2018). We hypothesized that, because the Ultimatum Game is a situation in which the proposer is not fully in control (as the responder can choose whether to accept or reject a proposal), it would induce feelings of not being in control in the present. Ciampaglia et al. (2014) posit that the Ultimatum Game can be used to manipulate power by establishing a situation in which the proposer only sets the stage and the power lies with the responder who has the last say. Additionally, according to Gruenfeld et al. (2008), an increased sense of power is associated with an increased sense of personal control.

The Dictator Game is a modified version of the basic Ultimatum Game in which the proposer decides how much of the total sum to allocate to the other player—there is no responder, as the other player will have to accept the offer (Kahneman et al., 1986). We hypothesized that, since the Dictator Game is a situation in

which the proposer has complete control, it would induce feelings of being in control in the present. Levav & Smeesters (2011) used the Dictator Game in a similar way where they randomly assigned participants to either be the proposer or the recipient. They found that the manipulation worked, and proposers did feel a higher sense of control than the recipient, which ultimately had an effect on their dependent variable (Levav & Smeesters, 2011).

III. Hypotheses (178 words)

Our hypotheses are motivated by past research and the existing gaps in the literature as highlighted above. The research question we attempt to answer is: does temporality of control affect belief in the existence of a controlling God? A secondary research question explored is: are situational procedures more effective in inducing a lack of control as compared to an autobiographical recall task?

A summary of our hypotheses are as follows:

H_1: Perceptions about lack of control in the present will lead to an increased belief in the existence of a controlling God.

H_2 (from the replication study)**:** Situations in which one had no personal control will result in a more fervent belief in the existence of a controlling God, compared to situations in which one does have personal control.

Additionally, our secondary hypotheses are:

H_3: Engaging in the Ultimatum Game will be more effective in inducing a lowered sense of control as compared to autobiographical recall.

H_4: Engaging in the Dictator Game will be more effective in inducing an increased sense of control as compared to autobiographical recall.

IV. Experimental Design (1,552 words)

We conducted an experimental study with a 2x2 factorial design (Figure 1) that explored the question of whether temporality of perceived control (IV) influences belief in the existence of a controlling God. We recruited participants using MTurk and administered a survey via Qualtrics.
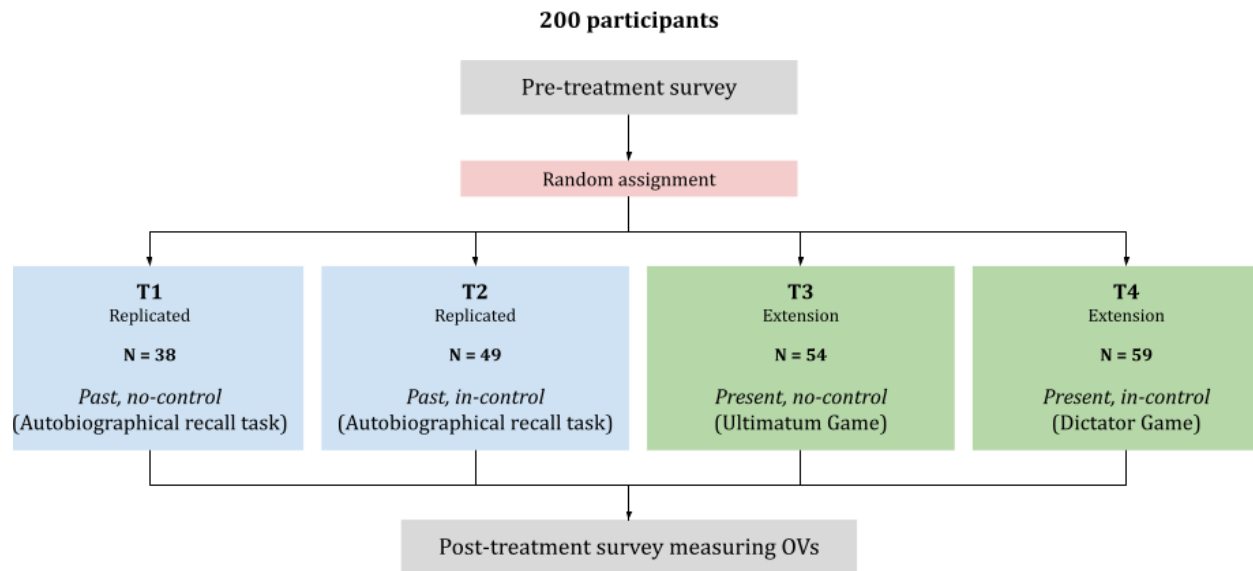
Figure 1

2x2 Factorial Design of Experimental Conditions

Control

		No-control	In-control
Temporality	*Past*	T1: Past, no-control	T2: Past, in-control
	Present	T3: Present, no-control	T4: Present, in-control

Treatments

Participants were randomly assigned to one of four conditions (Figure 2):

1. T1 (original): *Past, no-control:* Participants were asked to recall and describe in writing a positive event that made them feel not in control.

2. T2 (original): *Past, in-control:* Participants were asked to recall and describe in writing a positive event that made them feel in control.

3. T3 (new): *Present, no-control:* Participants played 10 rounds of the Ultimatum Game in which they were the proposer and, therefore, not in control of the game's outcomes.

4. T4 (new): *Present, in-control:* Participants played 10 rounds of the Dictator Game in which they were the Dictator and, therefore, in control of the game's outcomes.

Figure 2

Design of the Experiment

200 participants

Pre-treatment survey

Random assignment

T1	T2	T3	T4
Replicated	Replicated	Extension	Extension
N = 38	N = 49	N = 54	N = 59
Past, no-control (Autobiographical recall task)	*Past, in-control* (Autobiographical recall task)	*Present, no-control* (Ultimatum Game)	*Present, in-control* (Dictator Game)

Post-treatment survey measuring OVs

Note. The number of participants indicated in this figure represents those who were invited to the study. However, the total number of participants in T1 and T2 changed to 18 and 19 after participants were removed using the exclusion criteria.

Pretest

Before collecting data for the final study, we conducted a pretest in which three conditions were tested: *past, no-control*; *present, in-control,* and *present, no-control.* 100 participants were recruited for the pilot test (~30 per condition). We tested the two new conditions due to the lack of scientific evidence around using economic games as treatments to measure outcomes. We also tested the original no-control treatment to get some preliminary results on the effect of our independent variable on our dependent variable. These pretest data were then used to determine the sample size for the final study. Following the pretest, we made minor design adjustments to the survey and preregistered our research on AsPredicted.org (Appendix A).

Sampling plan

Post Pretest - G*Power calculations (before the final data collection)

Using the data from the pretest, the sample size for the final study was calculated using an a priori two-tailed Wilcoxon-Mann-Whitney test in G*Power (Appendix B). The input means for the T1 *(past, no-control)* and T3 *(present, no-control)* groups were 3 and 3.51, with standard deviations of 2.04 and 1.85, respectively. Using a significance level of $\alpha = 0.05$, the a priori calculation resulted in treatment group sizes of 238, with a total sample of 952 powered at 80% with an effect size of $d = 0.26$. This would have cost us approximately $851 to implement. However, due to budgetary constraints as a result of MTurk's incentive policies, we were only able to recruit a total of 200 participants for the final study.

Final G*Power Calculations

For our final data, we determined the effect sizes, statistical power, and required sample for 80% power using G*Power (Appendix B). The tests were done between our preregistered treatment groups, resulting in varying degrees of effect size and power. Using the same significance level of $\alpha = 0.05$ as in the pretest, the *past in-* and *no-control* groups demonstrated the greatest power and effect size, at 38% and 0.58, respectively (Table 1).

Table 1

Power calculations (Appendix B)

	T1; T2 *Past, no-control; past, in-control*	T3; T4 *Present, no-control; present, in-control*	T1; T3 *Past, no-control; Present, no-control*	T2; T4 *Past, in-control; present, in-control*
Effect Size	0.58	0.10	0.31	0.05
Power	0.38	0.08	0.20	0.05
Required sample per group (80% power; 1:1 allocation)	50	1645	173	6577

Participants

Individuals who were 18 years old or older and consented to participate in the study were included in our sample. No other demographic exclusions were used given the original study's findings that factors such

as gender, level of education, compensation, and data collection settings were not significant moderators of the effect (Hoogeveen et al., 2018).

In line with Hoogeveen et al.'s (2018) study, participants were also excluded from the analysis if any of the following applied to them:

1. Spent less than 40% of the median time that participants spent on any of the tasks.

2. Did not articulate their stories sensibly enough for those to be comprehended by the research team. We define "nonsensical" stories as those where participants typed an arbitrary string of letters or words in order to move forward in the survey.

3. Were unable to recall a situation that meets the required characteristics (i.e., a positive situation where they felt in/out of control).

After exclusions, the final sample consisted of 150 participants, of which 41% were female (Table 2). The median age of participants was 35 years (Table 3).

Table 2

Gender composition of participants

	T1 *Past, no-control* **Autobiographical Recall Task**	T2 *Past, in-control* **Autobiographical Recall Task**	T3 *Present, no-control* **Dictator Game**	T4 *Present, in-control* **Ultimatum Game**	Total
Males (1)	14	11	30	32	87
Females (2)	4	8	24	26	62
Other (3)	0	0	0	1	1
Total	**18**	**19**	**54**	**59**	**150**

Table 3

Age composition of participants

	T1 *Past, no-control* **Autobiographical Recall Task**	T2 *Past, in-control* **Autobiographical Recall Task**	T3 *Present, no-control* **Ultimatum Game**	T4 *Present, in-control* **Dictator Game**	Overall
Average Age *(in years)*	38	37	36	33	37
Median Age *(in years)*	40	38	37	36	35

Procedure

Participants were first shown an information screen (Appendix C) and asked to sign an informed consent form (Appendix D). They were then shown instructions (Appendix E) before being asked to respond to a pre-treatment survey consisting of four questions about their beliefs in the existence of a controlling God and their general sense of control (Appendix F). This pre-treatment survey was not a part of the replication study. However, we captured responses to these questions before participants were exposed to the treatment so that we could compare posttreatment responses against a baseline measurement. We also used this data to measure changes in beliefs with respect to our dependent variable (i.e., belief in a controlling God).

Following the pre-treatment survey, participants were randomly assigned to one of the four treatment conditions. In the two *past* conditions, participants engaged in a memory task wherein they were asked to recall a positive situation that happened to them in the past few months in which they either felt out of control (T1) or in control (T2) (Appendix G). These were the autobiographical recall tasks.

In the two *present* conditions, participants engaged in either the Ultimatum Game (T3) or the Dictator Game (T4) against a computer. To avoid deception, participants were proactively informed of this fact, and that all dollar amounts were hypothetical. Participants played for ten rounds given that studies have found that participant proposals do not approach equilibrium in Ultimatum Games, at least up to ten rounds (Gale et al., 1995). Playing ten rounds also allowed us to ensure participants were fully immersed in the experience of increased or reduced perceptions of control.

In the Ultimatum Game, participants took on the role of the proposer, determining the allocation of $10 since this is often the amount used in economic games (Thaler, 1988; Cooper et al., 2003). The participants were informed that the responder - in our case, the computer - could decide whether to accept the proposed amount and that if the proposal was rejected neither player would get the money (Appendix H). Thus, the proposer had no control over the game's strategy. On the other hand, participants were the deciders in the Dictator Game and were told that the responder will receive the remaining amount (Appendix I). Here, the Dictator had total control over the game's strategy while the responder's role was completely passive.

For the Ultimatum Game, we assigned acceptance probabilities to each dollar amount based on the participant's offer (Table 4).

Table 4

Acceptance probability as programmed on Qualtrics.

Proposed amount	$1	$2	$3	$4	$5	$6	$7	$8	$9	$10
Acceptance probability	0%	50%	70%	90%	100%	100%	100%	100%	100%	100%

These probabilities reflect real-life acceptance rates of proposed amounts in previously implemented Ultimatum Games. Most proposers tend to offer between 40% to 50% of the total sum and these offers are almost always accepted. When proposals fall to 20% of the total sum, they are rejected approximately half the time and rejection rates increase as the proposed amount falls to 10% or lower (Houser & McCabe, 2014).

After participants were exposed to the treatments, we administered the post-treatment survey (Appendix J) wherein we asked the same questions from the pre-treatment survey. This survey measured our primary outcome variable (POV)—belief in a controlling God. Participants were also asked general questions measuring levels of self-esteem, levels of introversion/extroversion, and experiences of negative/positive emotions, per the replication study, to conceal the research purpose (Appendix K). We also administered manipulation and comprehension checks to measure the effectiveness of our treatment, and to ensure participants understood the treatments (Appendix K, L).

Finally, consistent with the original replication, participants were asked to share some demographic information and indicate their level of religiosity (Appendix L).

Outcome variables

The POV we studied was the effect of our interventions on belief in a controlling God, based on the replication study. This was measured via two questions that asked participants to rate on a 7-point Likert scale the extent to which they believe that a controlling God is responsible for events within our universe and that events are unfolding based on God's plan (Hoogeveen et al., 2018) (Appendix J). For our analysis, we took the average of participants' answers to both questions, the same approach used by Hoogeveen et al. (2018).

A secondary outcome variable (SOV) we measured is perceptions of control after being exposed to the treatment. While this measure was used as a manipulation check in the replication, we included it as a secondary variable for our study given that one of our hypotheses is that the two economic games will be more effective in inducing perceptions of increased or reduced control. This SOV was measured by asking participants to rate on a 7-point Likert scale the extent to which they believe they are in control of their lives using two questions, asked by Hoogeveen et al. (2018) as manipulation checks. For our analysis, we took the average of participants' answers to both questions. In addition, we measured task-specific perceptions of control by asking participants to rate on a 7-point Likert scale the extent to which they felt like they had control over the situation in the recall treatments, or the extent to which they felt like they had control when playing the games (Appendix J).

Religiosity was measured as a covariate by asking participants to rate on a 7-point Likert scale how religious they consider themselves. This was expected to be highly correlated with the POV (Hoogeveen et al., 2018).

V. Analysis (1,353 words)

Primary Analysis

Table 5

Participant count pre- and post-exclusions

Condition	Total (pre-exclusion)	Total excluded	Total (post-exclusion)
T1: *Past, no-control*	38	20	18
T2: *Past, in-control*	49	30	19
T3: *Present, no-control*	54	0	54
T4: *Present, in-control*	59	0	59
Totals	**200**	**50**	**150**

Given the small, non-representative sample size, non-parametric methods of analysis (Wilcoxon Rank Sum test and Kruskal-Wallis test) were used to evaluate the study data. Bayesian frameworks were also used per Hoogeveen et al.'s (2018) methods of analysis. Based on our exclusion criteria, participants were excluded if they took less than 40% of the median time to complete the survey or did not write a coherent story in T1 *(past, no-control)* and T2 *(past, in-control)*. The total sample size pre- and post-exclusions are summarized in Table 5.

As a result of these exclusions, 20 responses from T1 and 30 responses from T2 were removed for incoherence. This severely undermined the power of the experiment and as a result, these conditions were insufficiently comparable with the *present* conditions. Overall, the study did not have sufficient participants to achieve power at the 80% level at 5% significance and the following results were between 5% - 38% power which cannot be interpreted as significant. In order to reach 80% power, T1 requires 50 participants (sample $n = 18$), T2 requires 1645 participants (sample $n = 19$), T3 requires 173 participants (sample $n = 54$), and T4 requires 6577 participants (sample $n = 59$).

After excluding responses that did not meet the inclusion criteria, the median age of participants was 35 years old, and the participants were 58% male, 41% female, and 0.6% other gender identity as shown in Tables 2 and 3.

Outcome Variables

Figure 3

Distribution of Belief in God responses
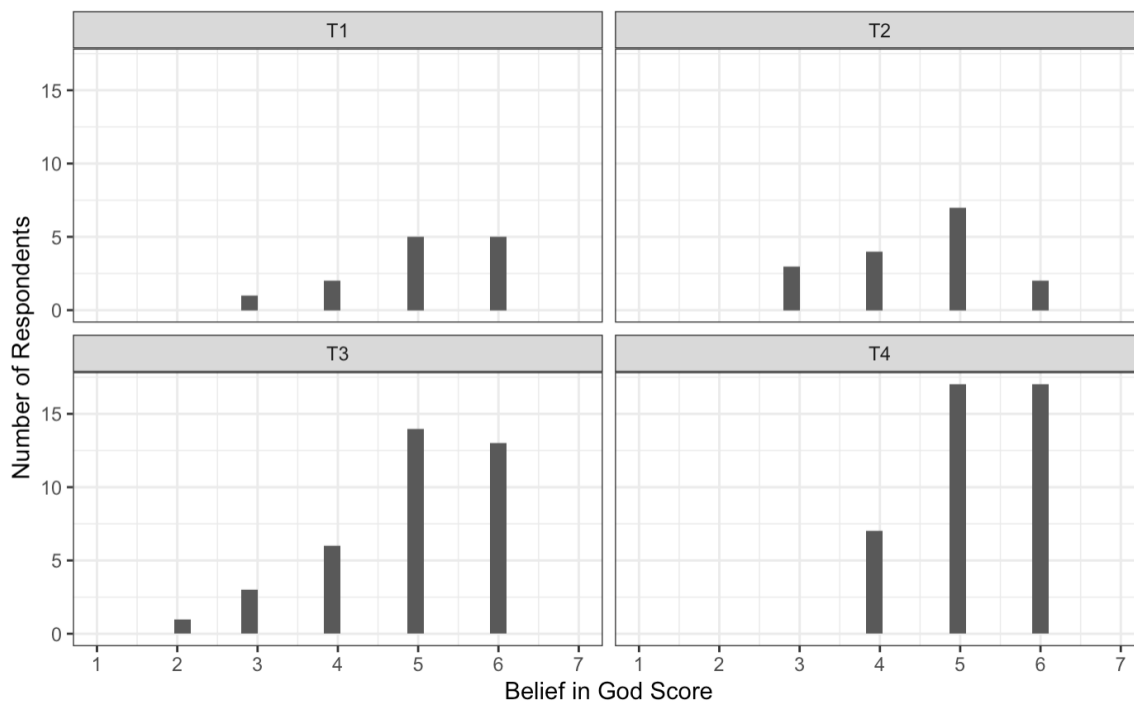
Note. Responses were scored on a 7-point Likert scale.

The primary outcome variable we measured was belief in the existence of a controlling God (subsequently referred to as Belief in God). The two questions we asked were, "to what extent do you think it is feasible that God, or some type of nonhuman entity, is in control, at least in part, of the events within our universe?", and "to what extent do you think that the events that occur in this world unfold according to God's, or some type of nonhuman entity's, plan?". Participants answered these questions using a 7-point Likert scale. For our analysis, we calculated the mean of the responses to the two questions. The distribution of participants' Belief in God scores is shown above (Figure 3). The means of the Belief in God scores in each treatment group ranged between 4.8- 5.6 with standard deviations ranging from 1.2- 1.8 (Appendix M).

The secondary outcome variable we measured was perceptions of control (subsequently referred to as Personal Control). Participants were asked to respond to two questions on a 7-point Likert scale. The questions were, "to what extent do you feel like you are the one who is in control of your life?" and "to what extent do you consider yourself the actor in, or the director of, your life?". For our analysis, we calculated the mean of the responses to the two questions. The means of the Change in Personal Control scores ranged between 5.0- 5.4 with standard deviations ranging from 1.1- 1.5 (Appendix M).

Hoogeveen et al (2018) found self-rated religiosity to have significant outcomes on Belief in God as a covariate to their study. This covariate was included in the original study and this replication's post-treatment survey and was measured on a 7-point Likert scale in response to the question "how religious do you consider yourself?".

All outcome variables and their respective calculations were consistent with Hoogeveen et al.'s (2018) methodology.

Evaluation of hypotheses

Hypothesis 1 was tested by comparing the effects of manipulating personal control on Belief in God between the *present no-control* treatment (T3) and the remainder of the treatments (T1, T2, and T4) using the Wilcoxon Rank Sum test and Bayesian factor analysis.

Hypothesis 2 was tested by comparing the effects of manipulating personal control on Belief in God between the *no-control* treatments (T1 and T3) and the *in-control* treatments (T2 and T4) using the Wilcoxon Rank Sum test and Bayesian factor analysis.

Hypotheses 3 and 4 were tested by comparing the means of the change in the Personal Control outcome variable pre-treatment and post-treatment between T3 to T1 and T4 to T2, respectively.

Hoogeveen et al.'s method of Bayesian factor analysis was retained in the comparison of alternative and null linear models for all hypothesis tests. Bayesian analyses were used in anticipation of "small to medium sized" effects, their intuitive quantification of direct support for the null vs alternative hypotheses, and their reliance on observed data (Hoogeveen et al., 2018). Prior model odds were assumed equal for all models as Jeffery-Zillnow-Siow priors per the original study. Models moderated for Condition primes, religiosity as a covariate, and sense of control as a covariate. Additional two-tailed Wilcoxon Rank Sum tests were conducted to determine significance between median values since all analyses were conducted between groups.

Finally, we used Ordinary Least Squares (OLS) regression to verify the predictive power of the manipulations against potential confounds in the manipulation check variables. The regression model is as follows:

$$\text{Belief in a Controlling God} = \alpha + \beta_1(\text{factor(Condition)}) + \beta_2(\text{Religiosity}) + \beta(\text{Personal control})$$

Results

Hypothesis 1

Table 6

Posterior Model Probabilities for Hypothesis 1

Model	Posterior Probability
[1] Religiosity Only	0.7803936
[2] Condition + Religiosity	0.1708521
[3] Religiosity + Condition + Religiosity: Condition	0.04875432
[4] Intercept Only	1.184401e-24

Note. All model priors were assumed to be equally likely *a priori*.

Figure 4

Mean Belief in God scores in the present no-control *condition vs other treatments*
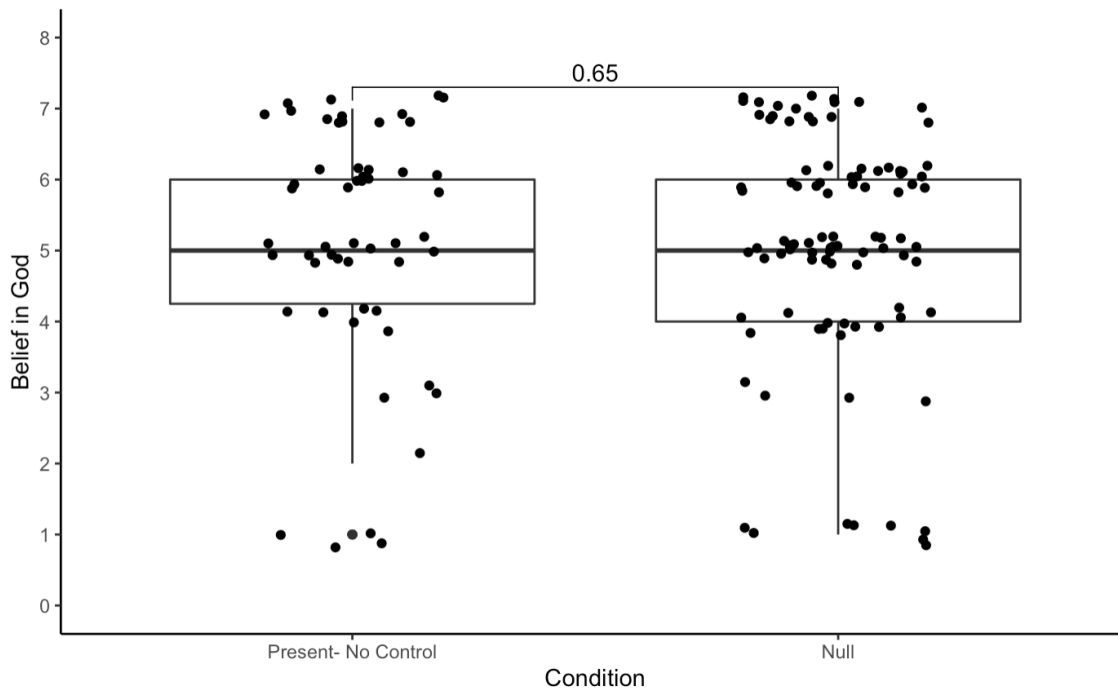
Note. Points were jittered for clarity of distribution

Hypothesis 1 (H$_1$) was evaluated by isolating the model for the effects of the *present, no-control* condition (T3). The posterior probabilities shown in Table 6 do not support a main effect of the Ultimatum Game inducing significant differences in Belief in God against the other treatment conditions. Participants' self-scored religiosity had the most significant predictive effect while the interaction of the condition and religiosity showed no effect. This means that the effect of the Ultimatum Game was not activated by higher religiosity.

Using a two-tailed Wilcoxon test, the difference between T3 and the other manipulations was not significant ($p = 0.65$) (Figure 4). Participant results in this condition did not vary enough to determine that inducing a lack of control by playing the Ultimatum Game could affect a participant's belief in God.

Hypothesis 2

Table 7

Posterior Model Probabilities for Hypothesis 2

Model	Posterior Probability
[1] Religiosity Only	0.798643
[2] Condition + Religiosity	0.1843838
[3] Religiosity + Condition + Religiosity: Condition	0.01697323
[4] Intercept Only	1.212098e-24

Note. All model priors were assumed to be equally likely *a priori.*

Figure 5

Mean Belief in God scores for the in-control *and* no-control *conditions across both temporal manipulations.*
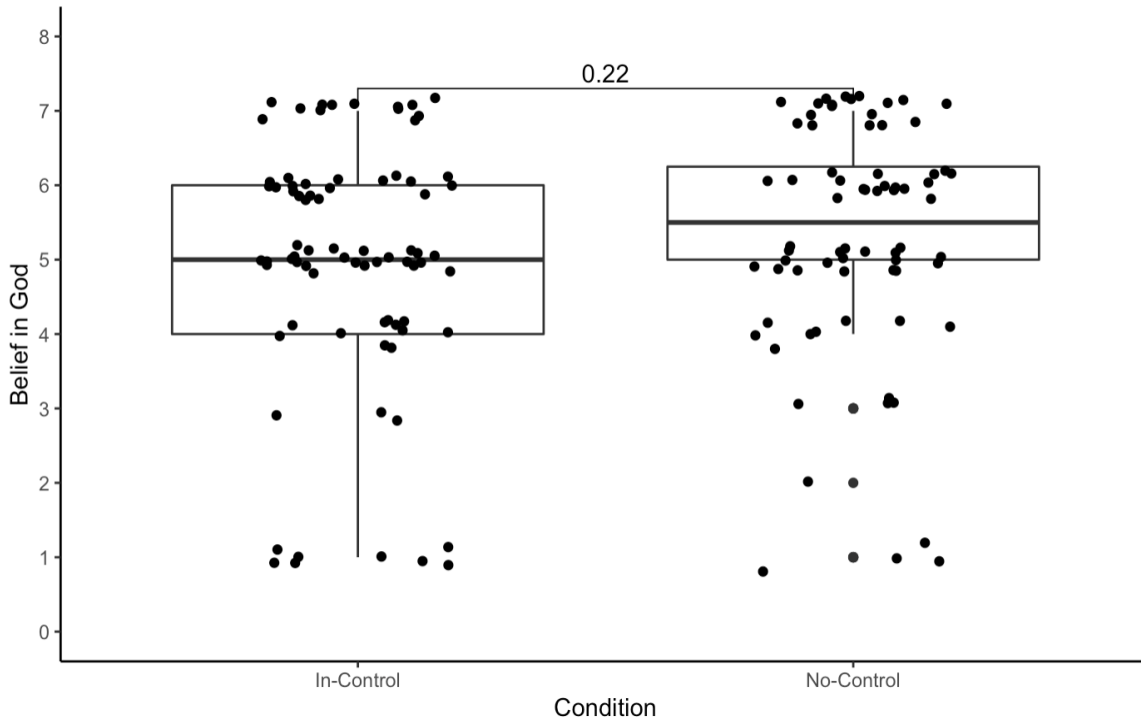
Note. Points were jittered for clarity of distribution.

Hypothesis 2 (H$_2$) was evaluated by comparing the effects of the *in-control* conditions (T1 and T3) against the *no-control* conditions (T2 and T4); there was no main effect of the control manipulation on the Belief in God outcome variable (p= 0.22) (Figure 5). Religiosity remained the strongest predictive factor of Belief in God and the manipulation of control context was not activated by increased religiosity as shown in the posterior probabilities summarized in Table 7.

Hypothesis 3

Table 8

Posterior Model Probabilities for Hypothesis 3

Model	Posterior Probability
[1] Religiosity	0.2191649
[2] Temporality + Religiosity	0.09322984
[3] Religiosity + Temporality + Religiosity: Temporality	0.03281203
[4] Intercept only	0.6547932

Note. All model priors were assumed to be equally likely *a priori.*

Figure 6

*Change in Sense of Control between the* past *and* present *conditions of the* no-control *conditions.*
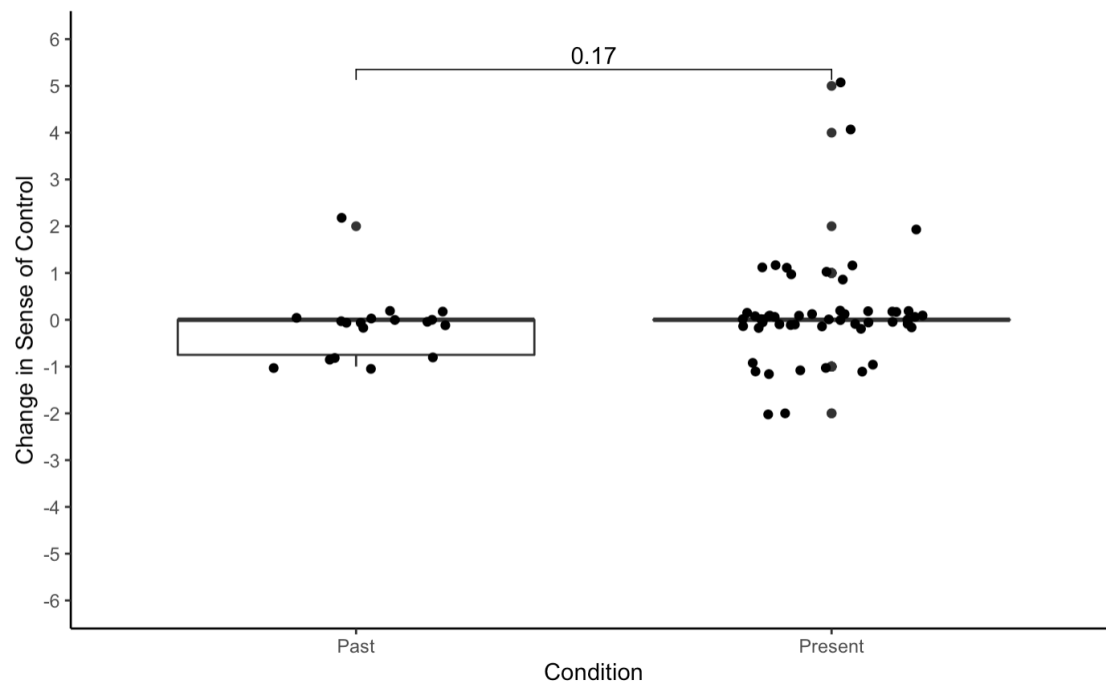
Note. Points were jittered for clarity of distribution

Hypothesis 3 (H₃) evaluated the effect of temporality on the *no-control* condition, comparing the effects of the Ultimatum Game (T3) against the effects of the past written autobiographical recall task (T1). Neither religiosity nor temporality accounted for significant predictive main effects (p= 0.17) (Figure 6), however, the posterior probability of the interaction effect of religiosity and temporality provided strong evidence for the interaction model (Table 8). This model indicates that higher self-rated religiosity coupled with the *past, no-control* autobiographical task resulted in a greater Belief in God.

Hypothesis 4

Table 9

Posterior Model Probabilities for Hypothesis 4 (H₄)

Mode	Posterior Probability
[1] Religiosity	0.1677718
[2] Temporality + Religiosity	0.1243255
[3] Religiosity + Temporality + Religiosity: Temporality	0.04774732
[4] Intercept only	0.6601554

Note: All model priors were assumed to be equally likely *a priori.*

Figure 7

Change in Sense of Control in past *and* present *conditions in the* in-control *conditions.*
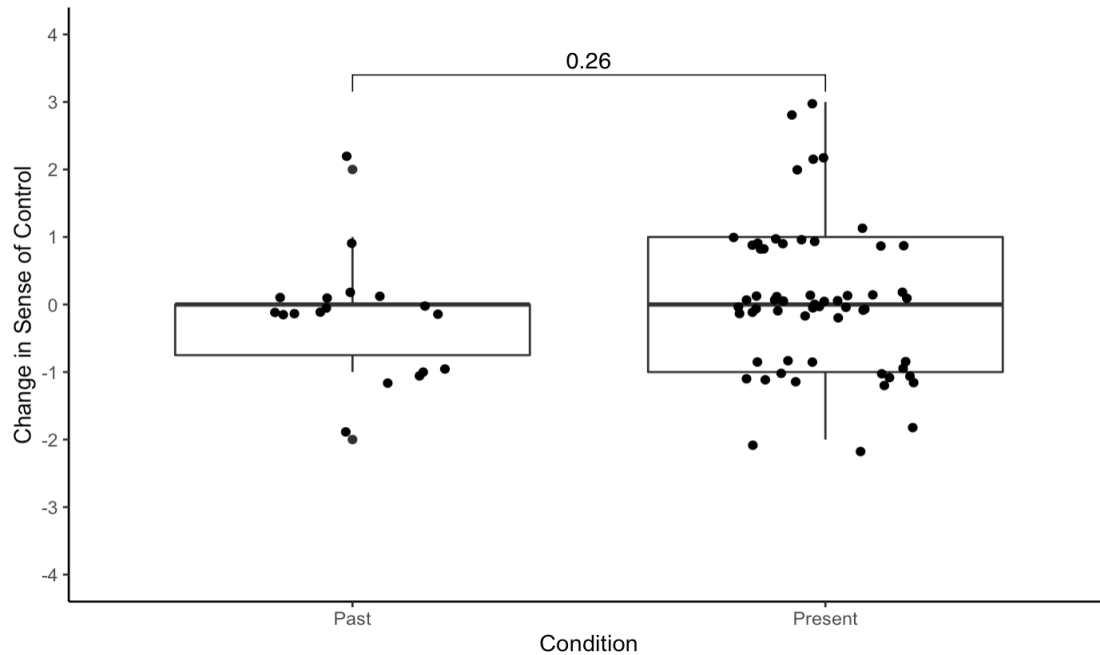
Note. Points were jittered for clarity of distribution.

Hypothesis 4 (H4) evaluated the effect of temporality on change in sense of control in the *in-control* condition, comparing the effects of the Dictator Game (T4) against the effects of the past written autobiographical recall task (T2). Neither religiosity nor temporality had a significant effect (p=0.26) on the change in sense of control (Figure 7). The interaction effect of the model was not significant (Table 9).

Figure 8

Outcome variable Belief in God for all conditions
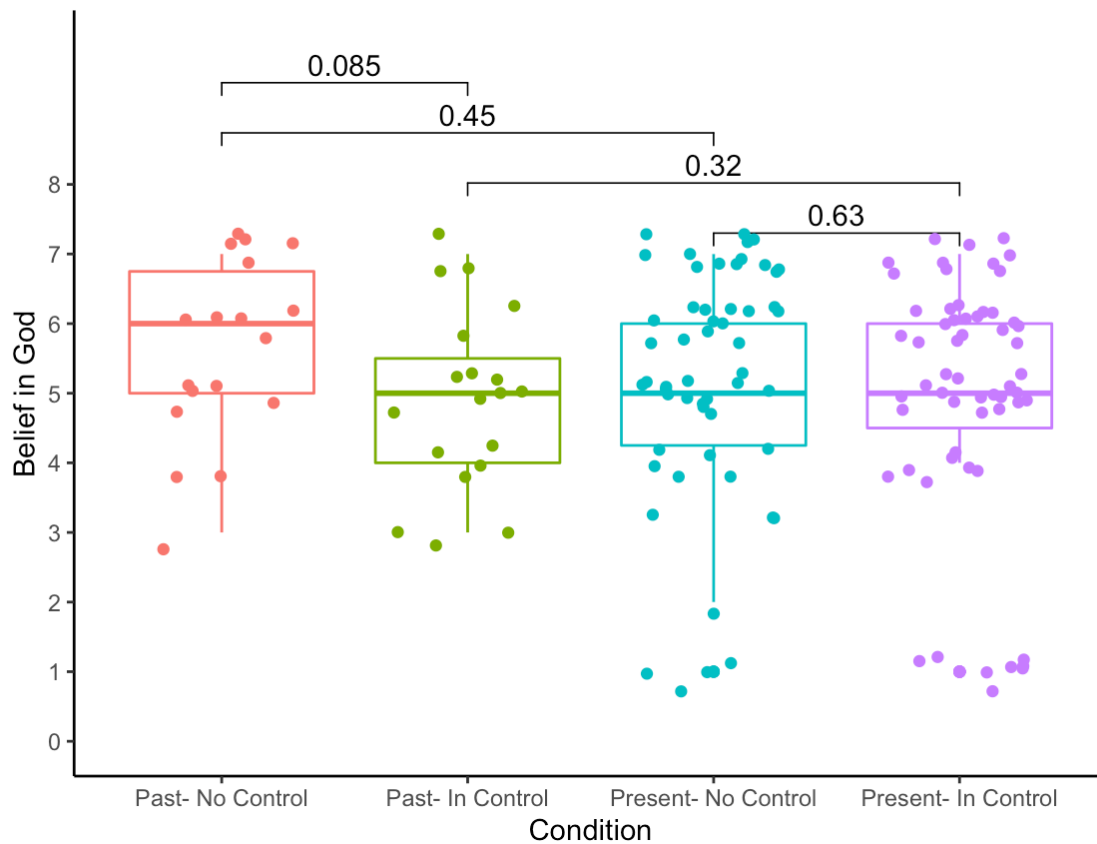
Note. P-values of Wilcoxon Rank Sum test shown between conditions. Median values are shown in the center of each box. The upper and lower bounds of the box mark the 75th and 25th percentile respectively. Points were jittered for clarity of distribution.

To compare the differences between the distributions of the populations, a Kruskal-Wallis test was conducted and showed no significance between the groups ($p = 0.39$). The pairwise Wilcoxon Rank Sum test is shown in Figure 8 indicating the level of significance between the *no-control* conditions (T1 and T3) ($p = 0.45$), *in-control* conditions (T2 and T4) *(p=0.32)*, *past* conditions (T1 and T2) *(p=0.085)*, and *present* conditions (T3 and T4) *(p=0.63)*, none of which were significant at the 0.05 level.

Robustness Check OLS

Table 10

Regression OLS table

% Table created by stargazer v.5.2.2 by Marek Hlavac, Harvard University. E-mail: hlavac at fas.harvard.edu
% Date and time: Sun, Dec 12, 2021 - 13:25:29

Table 10:Regression table of OLS regression

	Dependent variable:
	meanDV
factor(Condition)2	−0.738** (0.367)
factor(Condition)3	−0.590* (0.303)
factor(Condition)4	−0.524* (0.300)
Reli	0.659*** (0.051)
meanC	0.032 (0.068)
Constant	2.072*** (0.469)
Observations	150
R^2	0.562
Adjusted R^2	0.547
Residual Std. Error	1.114 (df = 144)
F Statistic	36.927*** (df = 5; 144)

Note:	*p<0.1; **p<0.05; ***p<0.01

Finally, an OLS regression was performed to verify the robustness of the findings. The results showed significance of T1 and T2, which is inconsistent with our results from the Bayesian factors analysis and Wilcoxon Rank Sum tests (Table 10). Religiosity also showed significance as is consistent with the covariate hypothesis. Given the small sample size and low power of the study, little importance can be interpreted from these results. Due to this discrepancy, the results cannot be justified as robust.

VI. Discussion (1,191 words)

Per H_1, we predicted that a lack of present control would lead to a higher belief in a controlling God when compared to the other treatments. Our experimental findings did not support this hypothesis. There was no significant difference between the treatment groups on our primary outcome measure. Additionally, reduced personal control irrespective of temporal manipulations was not associated with a belief in a controlling God (H_2).

Our hypotheses were formed based on research conducted by Frazier et al. (2001; 2011) who found that perceptions of present control are associated with reduced stress whereas perceptions of past and future control are unrelated. Additionally, Kay et al. (2008; 2016) found a causal relationship between a lack of personal control and one's belief in a controlling God. While our results were inconsistent with these findings, they were in line with the results from Hoogeveen et al.'s (2018) replication study. One explanation for this could be that our study was underpowered due to budgetary constraints and our exclusion criteria which resulted in the exclusion of 25% of our sample.

We had also hypothesized, per H_3 and H_4, that the economic games would be more effective than the autobiographical recall task in inducing an increased or lowered sense of control. However, participants did not show a significant change in sense of control between the pre-treatment and post-treatment surveys in any of the conditions. This is in line with research conducted by Siedlecka & Denson (2019), which found that autobiographical recall and situational procedures are equally effective in inducing a wide range of target emotions. In our case, both prime types were equally ineffective. The failure of our primes could be another reason why we did not see significant results in favor of H_1 or H_2.

Limitations

Certain limitations in our study design also may have contributed to our lack of significant findings.

First, we were unable to make the economic game primes incentive compatible. Due to restrictions imposed by our budget, all dollar amounts in our study were hypothetical as a result of which there were no real consequences for participants' choices. This restriction especially has implications on both our *present* primes. The increased or lessened control we were intending to induce by manipulating whether the participant is controlling the outcome of the game may not have had an effect because the participants did not "control" or "lose" actual money. If we were to pursue this study in the future, we would leverage induced value theory (IVT) when implementing the economic games to ensure the effectiveness of our primes (Smith, 1976).

Second, to maintain consistency with the replication study (Hoogeveen et al., 2018), we did not include a true baseline control group in the experiment. Due to budgetary limitations, we were unable to sample enough participants to include a fifth, control group because of the necessity of maintaining the replication treatment arms while successfully implementing our situational procedure hypotheses. A baseline control group would be a useful addition in better understanding the effects of all treatments, including the original ones.

Finally, the rigorous exclusion criteria we set for the autobiographical recall treatment arms significantly reduced the power of our study. Upon application of exclusion criteria, over 50% of the responses in both T1 and T2 were excluded. Oversampling for these treatments is one potential solution. It has also been found that MTurk participants may not be as motivated to participate mindfully in tasks, instead focusing mainly on completion for financial incentives, and also may be motivated to complete tasks that they are not equipped to do for the sake of compensation (Pavlick, 2014). This finding may have significantly interfered with our ability to appropriately induce feelings of increased or reduced control among our participants, thereby weakening the study effect.

Policy implications

Even though our results were not significant, our research still provides a basis to conduct further research on the temporality of control and the effectiveness of situational procedures in relation to CCT. It is evident from the literature that evidence on CCT is mixed. In their meta-analysis of seven studies replicating Kay et al.'s (2008) original research, Hoogeveen et al. (2018) found that "most studies provide only weak evidence for the effect of personal control threat on belief in a controlling God". They also found that studies on CCT have often been underpowered. However, other studies have shown that CCT often only applies in certain contexts (Stojanov et al., 2021).

One such context is COVID-19 and conspiracy theories. In a study conducted in New Zealand and North Macedonia, researchers found that participants from North Macedonia tended to believe more in conspiracy theories because their "mainstream" source of external control (the government) is perceived as ineffective. New Zealand, on the contrary, enacted science-driven communication and increased adherence to safety protocols. Belief in conspiracy theories caused by a lack of trust in the government could have negative effects on vaccine acceptance and adherence to COVID-19 protective behaviors. Governments can benefit from understanding that, in situations such as COVID-19 where individuals feel a lack of control, the need for communicating information is essential to citizens regaining that feeling of control. Thus, it is essential to study the effects of CCT from a policy perspective such that governments can position themselves as trustworthy sources of information and control to ensure the health and well-being of their citizens.

Conclusion & directions for future research (354 words)

Our study, despite its limitations, adds to a series of studies to open the "file-drawer" when it comes to studying CCT. The use of economic games to manipulate perceptions of control requires further research. While our use of economic games failed to produce significant effects, we cannot conclude that the use of these games alone failed to produce the intended effect due to the limitations outlined above. Therefore,

there remains an opportunity for researchers to explore other aspects of cognitive psychology in relation to these economic games, including induced feelings of helplessness or control, as this has not been sufficiently studied.

A potential direction for future research could be the use of a within-subjects design. This would involve two groups of participants playing both games but in different orders. We hypothesize that playing the Dictator Game first and then the Ultimatum Game would reinforce a feeling of reduced control as participants' control over the outcomes would be "taken away". We also hypothesize that the opposite would be true if the Ultimatum Game was played first. This design could lead to a greater change in the Belief in God dependent variable.

Another possible avenue for research related to this topic could be the use of a 2x2 treatment design, wherein groups in-control and no-control are provided affirmations or requested to recall specific situations.

Table 11

Proposed 2x2 Factorial Design to Assess Relationship between Written and Verbal Induced Feelings of Control

	In-Control	**No-Control**
Affirmations	Reciting affirmations of feeling in-control	Reciting affirmations of feeling out of control
Situational Recall	Writing about a time they felt totally in control of a situation	Writing about a time they felt they had no control over a situation

In the above-proposed treatment (Table 11), the extension would examine the relationship between perceptions of personal control either from verbal affirmations or from written primes for situational recall. Rather than focusing on temporality, given our extension's null findings among all the treatment groups, it may be worth focusing on different applications of verbal versus written personalized primes. This research might provide interesting insights on how control can be more effectively manipulated.

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Appendices:

Appendix A - Preregistration

Our experiment has been preregistered on https://aspredicted.org/. The anonymized preregistration file can be found at this link: https://aspredicted.org/blind.php?x=TF7_JGY

Appendix B - G*Power Calculations
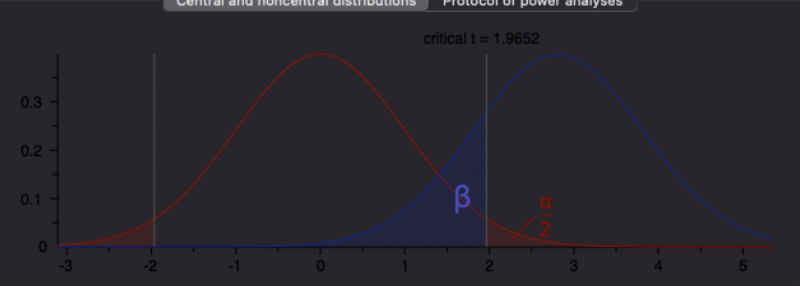
1. **Pretest: Post-hoc Calculation**
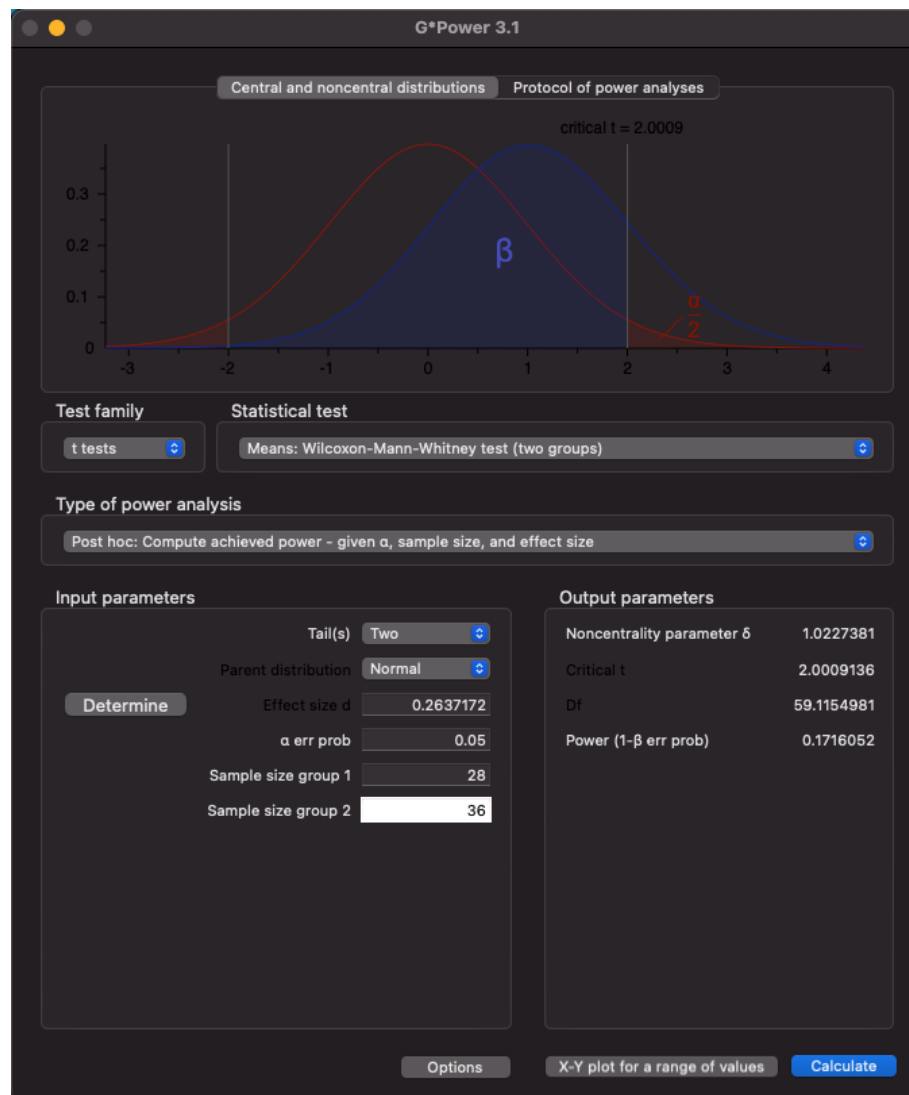
2. Pretest: A priori Calculation

3. **Final Post-hoc:** *past, no-control* **and** *past, in-control*

4. Final Post-hoc: *past, no-control* **and** *present, no-control*
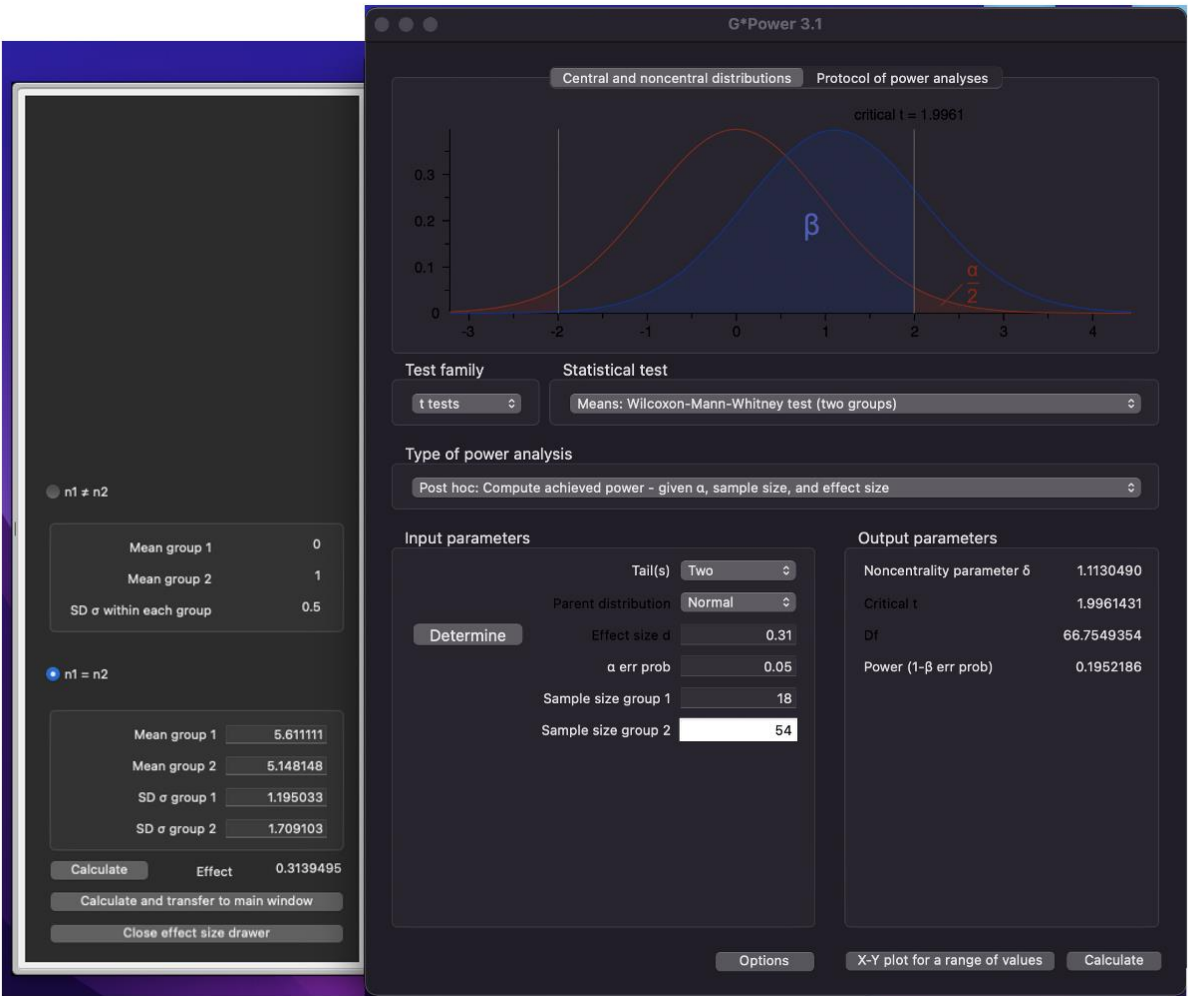
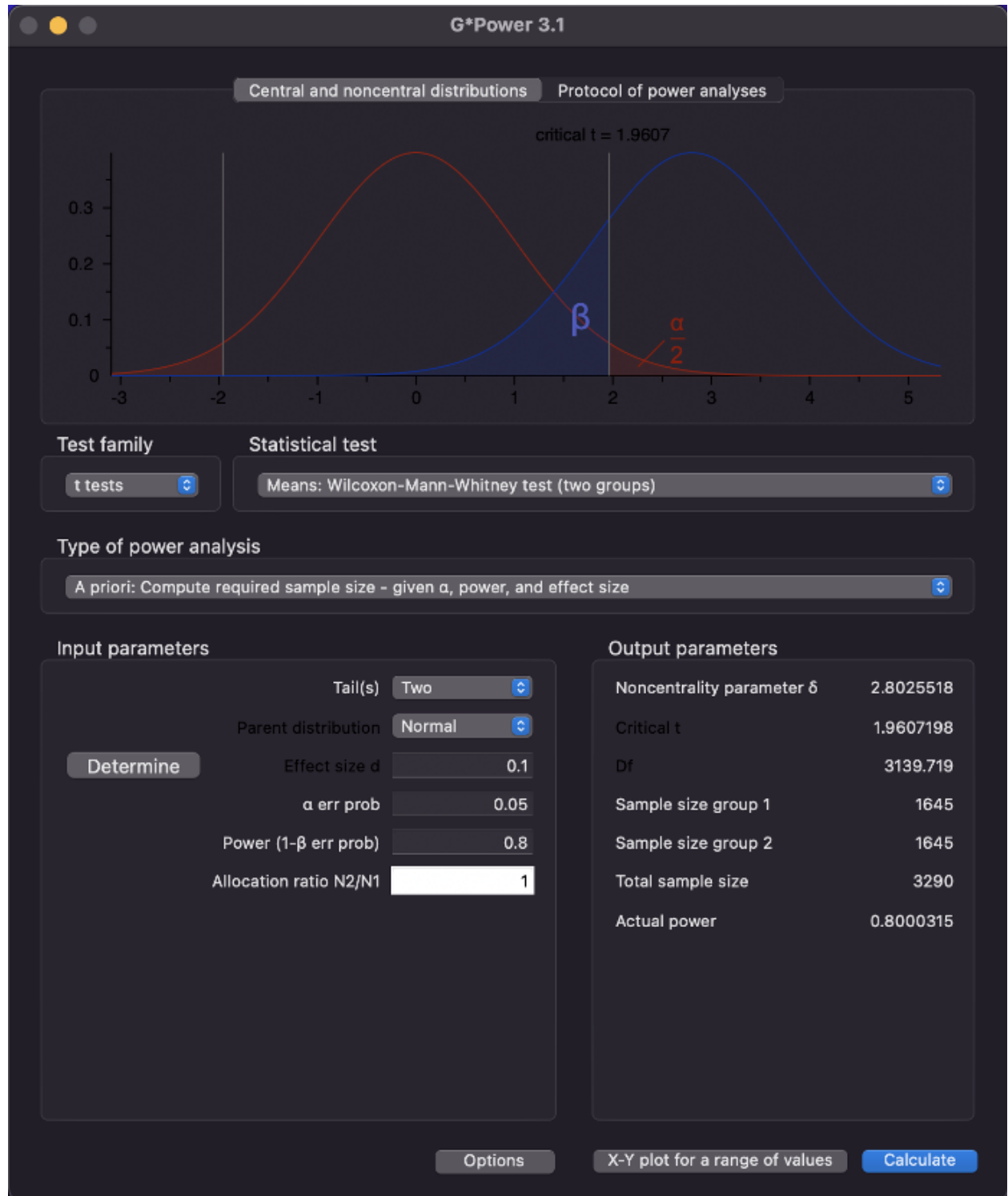**5.** *Final Post-hoc: present, in-control, and present, no-control*
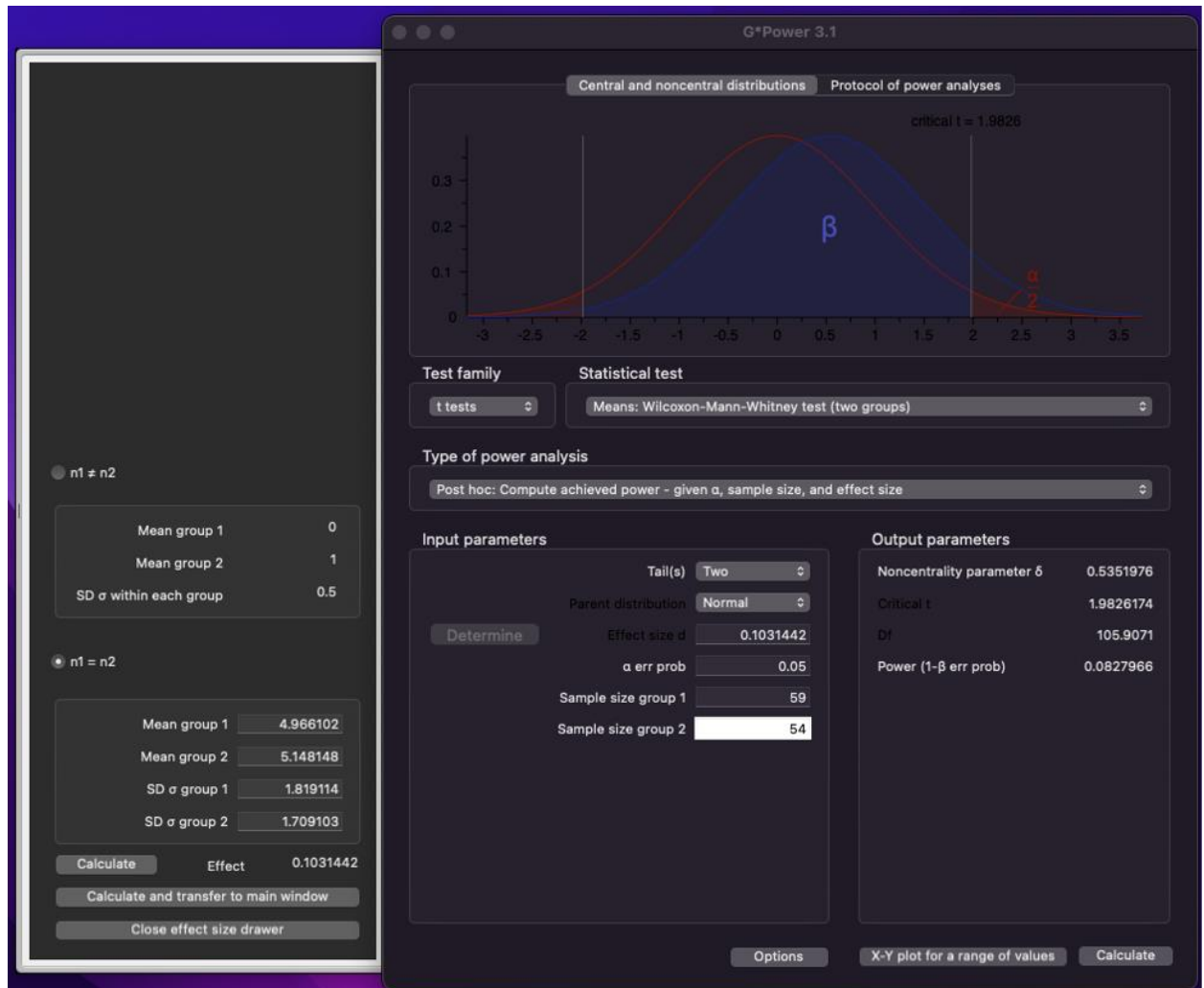
6. *Final Post-hoc: present, in-control and past, in-control*
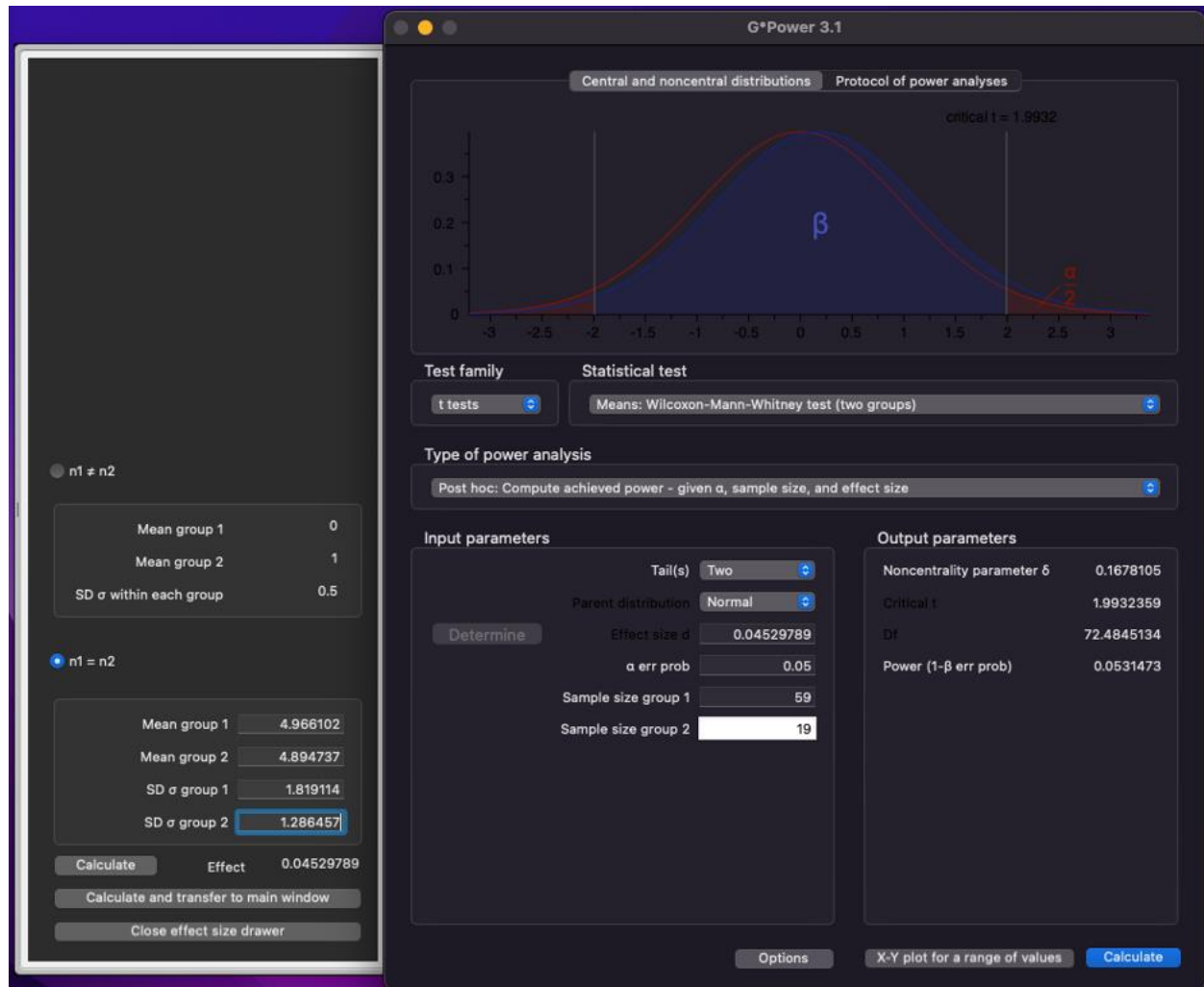
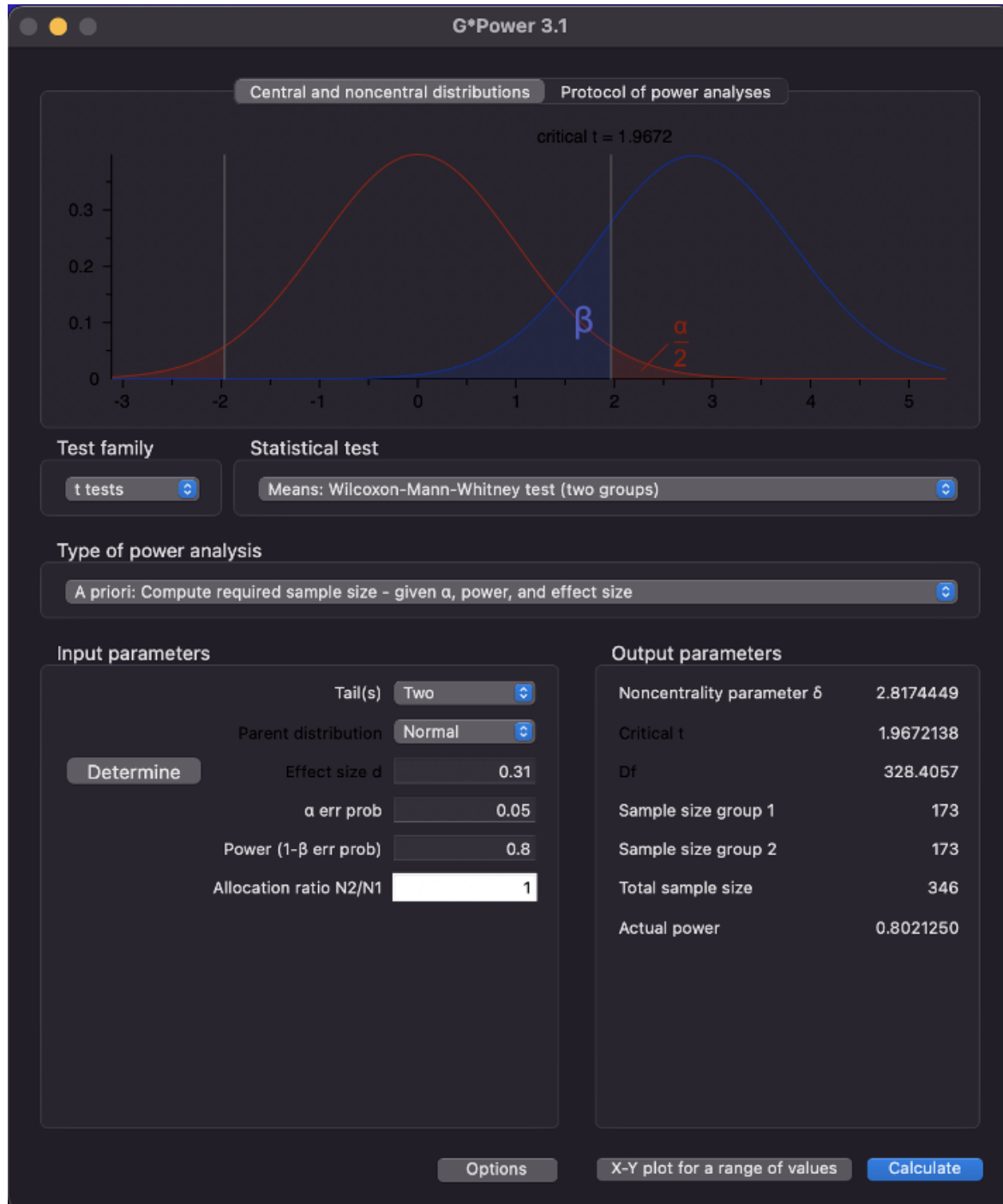**7. *Final A priori: past, in-control and past, no-control***
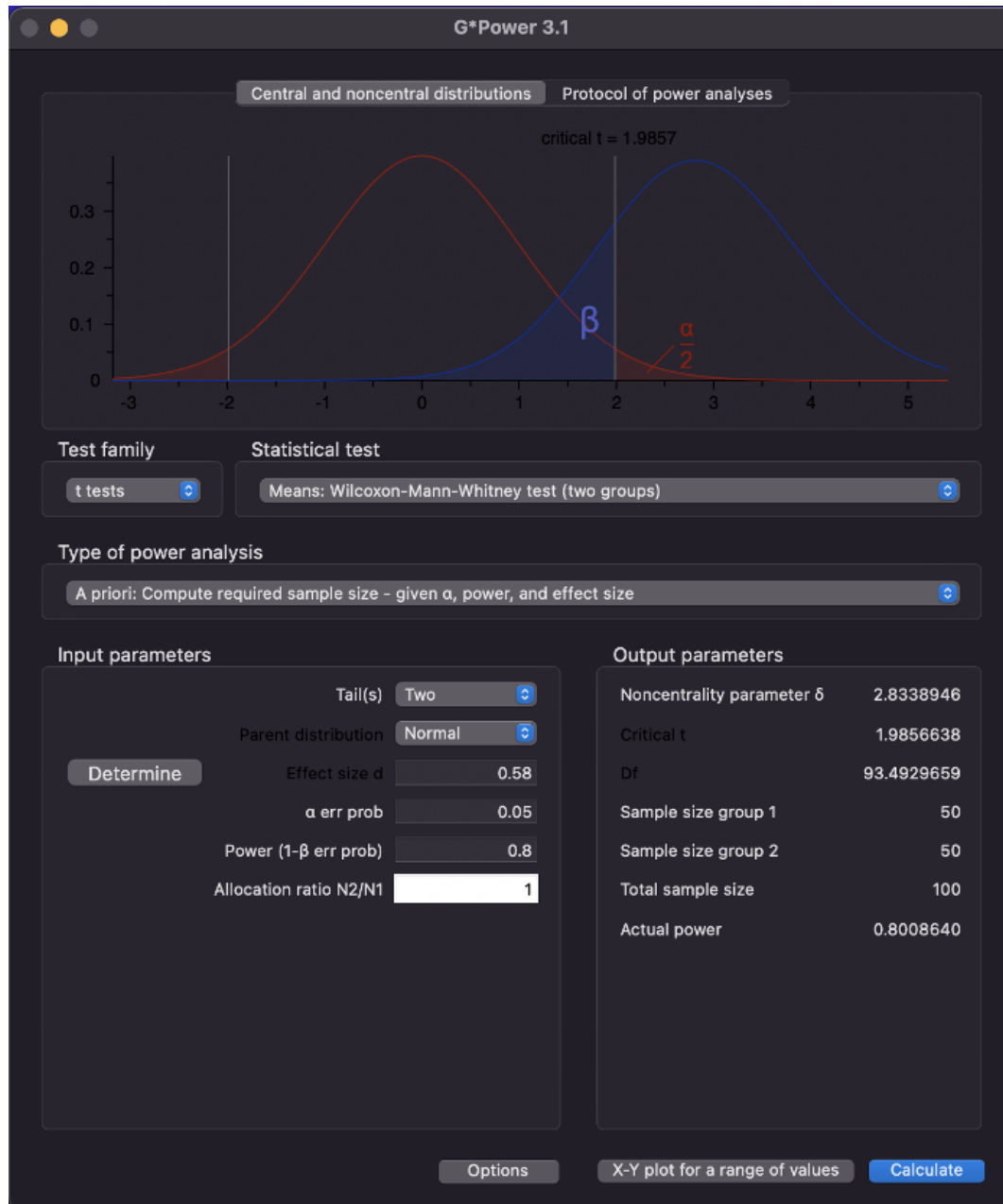
8. *Final A priori: present, in-control, and present, no-control*

9. *Final A priori: present, no-control and past, no-control*

(Note. Sample allocation set to 1. Our final data did not align with this allocation pattern due to exclusions. For a simple required sample calculation though, we felt using a one to one allocation would suffice)

10. Final A priori: present, in-control and past, in-control

(Note. Sample allocation set to 1. Our final data did not align with this allocation pattern due to exclusions. For a simple required sample calculation though, we felt using a one to one allocation would suffice)

Appendix C – Information Screen

Welcome to this survey.

Firstly, thank you for your interest! Before the experiment starts, it is important that you are informed about the procedures. Therefore, we would like you to read this information carefully.

Goal of the study and procedure

The goal of this study is to understand human beliefs. If you decide to provide consent, you will be asked to briefly recollect a specific event from your own experience, or play a short game. After that, there will be some general questions on personality and attitudes, and some questions on the situation you recalled, or the game you played. There are no right or wrong, or good or bad answers; please respond honestly and naturally to each question. The entire process will take approximately 10 minutes. Participants must be over 18 years of age, and be able to read and write in English.

Voluntary participation

There are no consequences if you decide not to participate in this study. During the experiment, you are free to stop participating at any moment without giving a reason for doing so. You can withdraw your permission for your answers and data to be used for this research within seven days after your participation by contacting the responsible researcher. If you choose to withdraw your participation, your data will be deleted permanently.

Your privacy is guaranteed

The researchers will analyze your data. Any data from this study which is published in scientific journals will be anonymous and cannot be traced back to you personally. Fully anonymous data may be shared with other researchers for scientific purposes. Your personal information will remain confidential and will not be shared with others without your explicit permission. Your privacy is guaranteed at all times.

Further information

Should you have questions about this study at any given moment, please contact the responsible researcher: Karuna Banerjee (karunab@sas.upenn.edu).

Thank you for your time.

Appendix D – Informed Consent Form

Please sign the form below to declare that you understand the nature and methods of this study as described in the previous screen.

Should you have questions about this study at any given moment, please contact the responsible researcher: Ms. K. Banerjee (karunab@sas.upenn.edu).

[Participant]

"I have read and understood the above information and give permission for participation in the research and use of the data obtained with it. I reserve the right to withdraw my participation from the study at any moment without providing any reason."
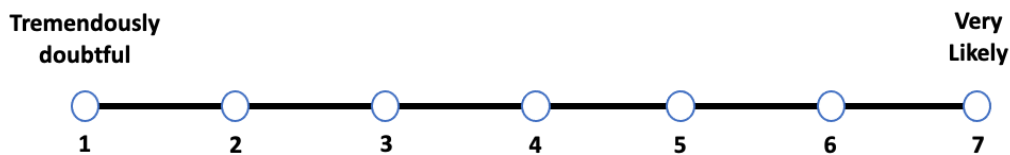
- I do not agree to participate in this study

- I agree to participate in this study and state that I am 18 years or older
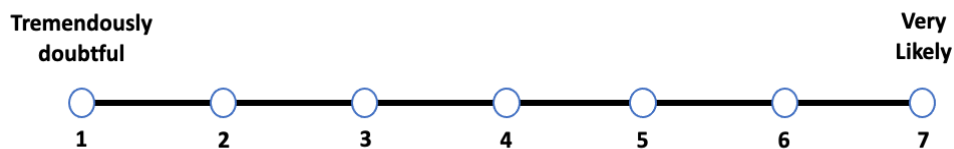
Appendix E – Instructions

Hello! We will begin by asking you a few basic questions after which you will be asked to engage in a task. Click the button below to begin.
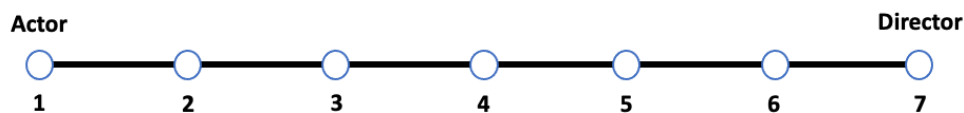
Appendix F – Pre-treatment survey

To what extent do you think it is feasible that God, or some type of nonhuman entity, is in control, at least in part, of the events within our universe?

Tremendously   **Very**
doubtful   **Likely**

    ○   ○   ○   ○   ○   ○   ○
    1   2   3   4   5   6   7

To what extent do you think that the events that occur in this world unfold according to God's, or some type of nonhuman entity's, plan?

Tremendously   **Very**
doubtful   **Likely**

    ○   ○   ○   ○   ○   ○   ○
    1   2   3   4   5   6   7

To what extent do you consider yourself the actor (executing actions) in, or the director (determining actions) of, your own life?

Actor   **Director**

    ○   ○   ○   ○   ○   ○   ○
    1   2   3   4   5   6   7

To what extent do you feel like you are the one who is in control in your life?

Not at all   **Very much**

    ○   ○   ○   ○   ○   ○   ○
    1   2   3   4   5   6   7

Note. The four pre-treatment questions were randomized for each participant.

Appendix G – Autobiographical recall task

In-control prime

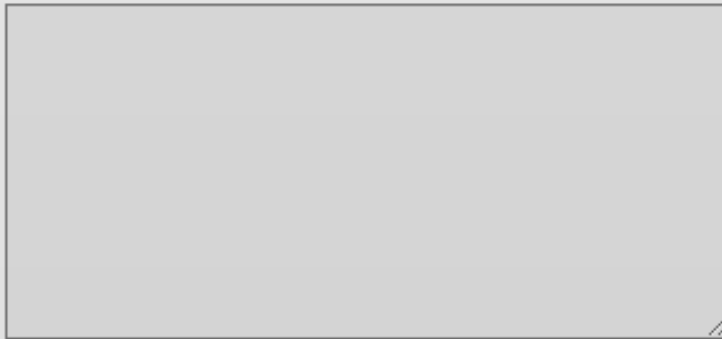Please try and think of something **positive** that happened to you in the past few months that you had **total control** over. Can you remember such a situation or event?

Try to briefly describe this controllable event in no more than 100 words. What happened and how did you feel?

Memory

Please try and think of something **positive** that happened to you in the past few months that you had **total control** over.
Can you remember such a situation or event?

Try to briefly describe this controllable event in no more than 100 words.
What happened and how did you feel?

No-control prime

Please try and think of something **positive** that happened to you in the past few months that you had absolutely **no control** over.

Can you remember such a situation or event?

Try to briefly describe this uncontrollable event in no more than 100 words. What happened and how did you feel?

Memory

Please try and think of something **positive** that happened to you in the past few months that you had absolutely **no control** over. Can you remember such a situation or event?

Try to briefly describe this uncontrollable event in no more than 100 words.
What happened and how did you feel?

Appendix H – Ultimatum Game Instructions

You will now be playing a game with a computer. All dollar amounts are hypothetical.

You have been randomly chosen as the "selector". In this game, imagine that you have the opportunity to split $10 with a stranger. You choose the amount they receive in dollar intervals, and they decide whether to accept or reject the offer. If they accept, you keep your portion, and they keep their portion. **If they reject, neither person gets any money.**

> You will now be playing a game with a computer. All dollar amounts are hypothetical.
>
> You have been randomly chosen as the "selector". In this game, imagine that you have the opportunity to split $10 with a stranger. You choose the amount they receive in dollar intervals, and they decide whether to accept or reject the offer. If they accept, you keep your portion, and they keep their portion. **If they reject, neither person gets any money.**
>
> →

Practice round

We will begin by playing one practice round. Please select $5 for this practice round.

How much money would you offer?

[If offer is accepted] - Your offer has been accepted. You get to keep the remainder of the $10.

[If offer is rejected] - Your offer has been rejected. You lose the $10 for this round.

We will begin by playing one practice round. Please select $5 for this practice round.

How much money would you offer?

$1	$2	$3	$4	$5	$6	$7	$8	$9	$10
○	○	○	○	◉	○	○	○	○	○

→

Your proposal has been accepted. You keep the remainder of the $10.

→

Main rounds

We will now begin the main rounds.

Round 1: How much money would you offer?

[If offer is accepted] - Your offer has been accepted. You get to keep the remainder of the $10.

[If offer is rejected] - Your offer has been rejected. You lose the $10 for this round.

Note. This continued for 10 rounds.

We will now begin the main rounds.

Round 1: How much money would you offer?

$1	$2	$3	$4	$5	$6	$7	$8	$9	$10
●	○	○	○	○	○	○	○	○	○

→

Your proposal has been rejected. You lose the $10 for this round.

→

Appendix I – Dictator Game instructions

Instructions

You will be playing a game with a computer, and all dollar amounts are hypothetical.

You have been randomly chosen as the "decider". In this game, imagine that you have the opportunity to split $10 with a stranger. You choose the amount they receive in dollar intervals, and the decision is final. **They do not have the opportunity to accept or reject your offer.** You keep the remaining money.

Practice round

We will begin by playing one practice round. Please select $5 for this practice round.

How much money would you offer?

[Displayed for all answering] The stranger gets [selected amount]. You keep the remainder of the $10.

We will begin by playing one practice round. Please select $5 for this practice round.

How much money would you offer?

$1	$2	$3	$4	$5	$6	$7	$8	$9	$10
○	○	○	○	◉	○	○	○	○	○

→

The stranger gets $5. You keep the remainder of the $10.

→

Main rounds

We will now begin the main rounds.

Round 1: How much money would you offer?

[Displayed for all answering] The stranger gets [selected amount]. You keep the remainder of the $10

Note. This continued for 10 rounds.

We will now begin the main rounds.

Round 1: How much money would you offer?

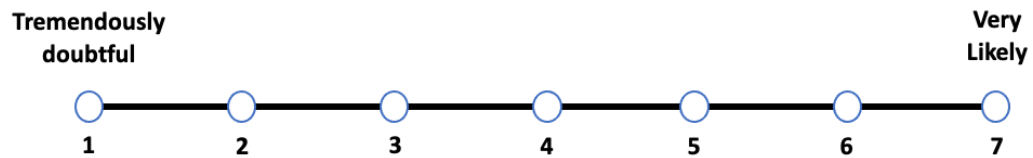| $1	$2	$3	$4	$5	$6	$7	$8	$9	$10
○	○	○	◉	○	○	○	○	○	○

→

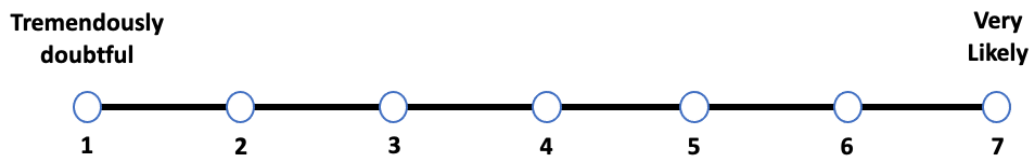The stranger gets $4. You keep the remainder of the $10.
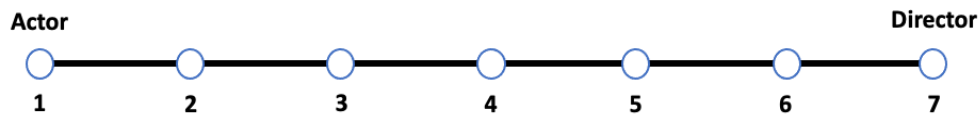
→

Appendix J – Post-treatment survey

To what extent do you think it is feasible that God, or some type of nonhuman entity, is in control, at least in part, of the events within our universe?

Tremendously doubtful						Very Likely
1	2	3	4	5	6	7

To what extent do you think that the events that occur in this world unfold according to God's, or some type of nonhuman entity's plan?

Tremendously doubtful						Very Likely
1	2	3	4	5	6	7

To what extent do you consider yourself the actor (executing actions) in, or the director (determining actions) of, your own life?

Actor						Director
1	2	3	4	5	6	7

To what extent do you feel like you are the one who is in control in your life?

Not at all						Very much
1	2	3	4	5	6	7
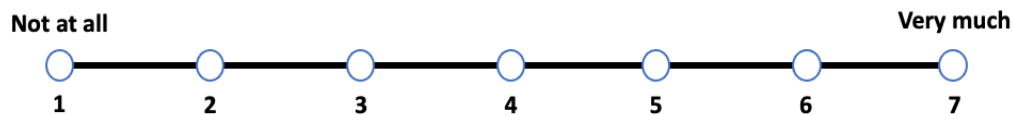
To what extent do you consider yourself a person with high self-esteem?

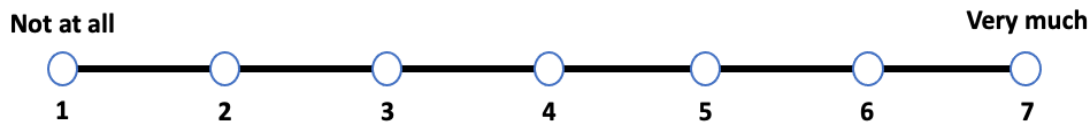| Not at all						Very much
1	2	3	4	5	6	7

Appendix K – General questions, manipulation checks

1. General questions

Where would you place yourself on an introversion - extraversion scale?

Introverted   **Extraverted**

1   2   3   4   5   6   7
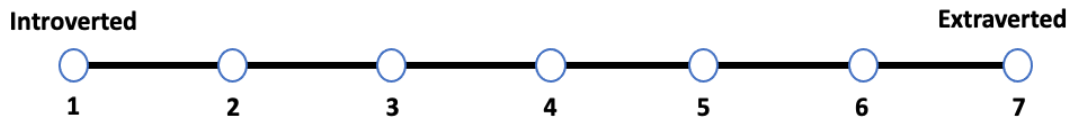
To what extent do you generally experience negative emotions?

Not at all   **Very much**

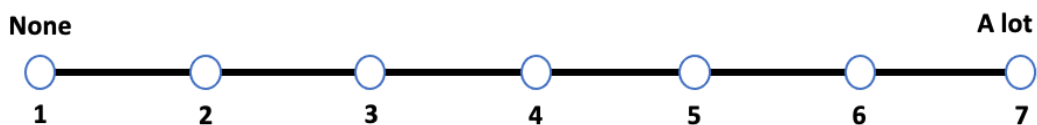1   2   3   4   5   6   7

To what extent do you generally experience positive emotions?

Not at all   **Very much**

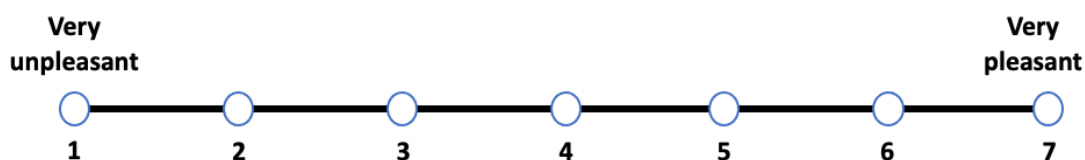1   2   3   4   5   6   7
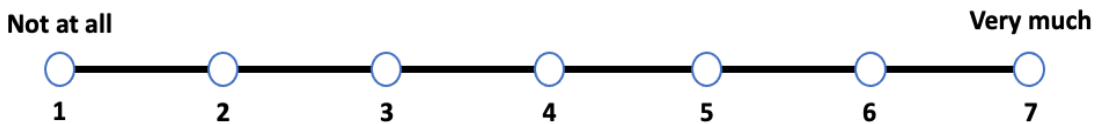
2. Treatment manipulation checks - Memory prime

Please again recall the situation or event that you described previously.

How much control did you have in the situation?

None   **A lot**

1   2   3   4   5   6   7

How pleasant did you find the situation back then?

**Very
unpleasant**   **Very
pleasant**

1   2   3   4   5   6   7

How vividly can you still experience the situation?

**Very
vaguely**   **Very
vividly**

1   2   3   4   5   6   7
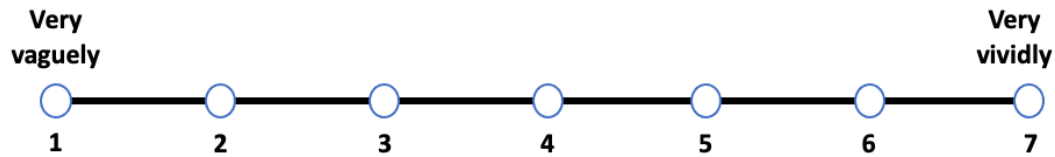
How significant was the situation to you?

**Not significant
at all**   **Very
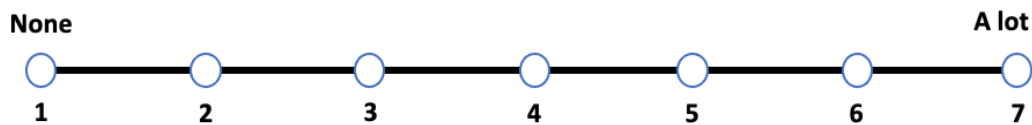significant**

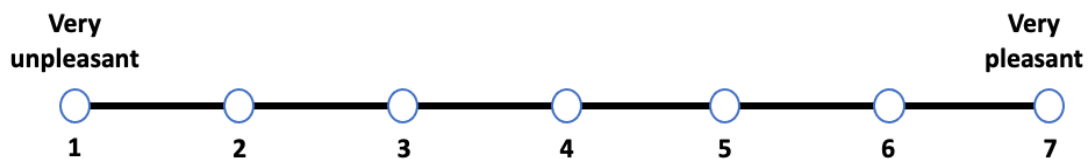1   2   3   4   5   6   7
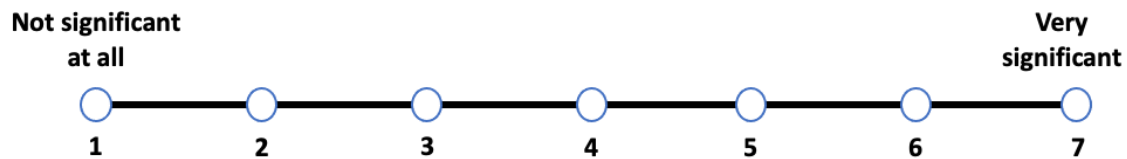
3. Treatment manipulation checks - Economic games prime

Please again recall the game you were asked to engage in.

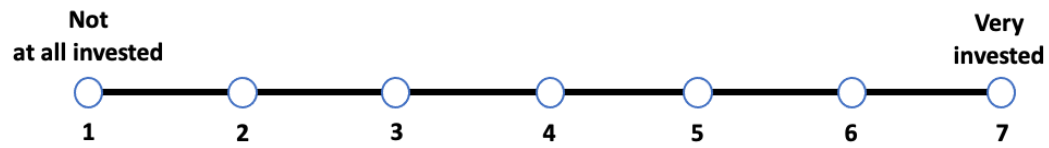How much control did you feel like you had during the game?

None   **A lot**

1   2   3   4   5   6   7

How pleasant did you find the game?

**Very
unpleasant**   **Very
pleasant**

1   2   3   4   5   6   7

How invested were you in the game?

Not at all invested ————————————————— **Very invested**

1 2 3 4 5 6 7

How well do you remember the rules of the game?

Not at all ————————————————— **Very well**

1 2 3 4 5 6 7
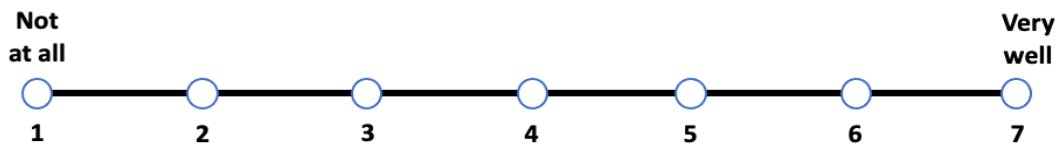
Appendix L – Comprehension check, Demographics

At the beginning of this survey you engaged in an activity. Which of the following were you asked to do?

- Recall a positive memory of a situation in which you felt no control.

- Recall a positive memory of a situation in which you felt total control.

- Select a dollar amount to give a stranger. They could accept or reject the offer.

- Select a dollar amount to give a stranger. The decision was final.

- None of the above

[Asked of participants who received a memory task] Have you previously participated in a study that used this specific memory task?
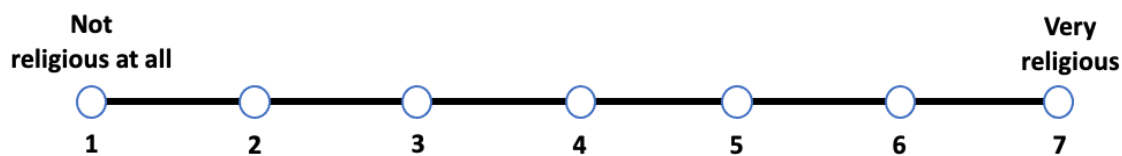
- Yes

- No

[Asked of participants who received an economic game] Have you previously participated in a study in which you have had to play such a game?

- Yes

- No

What do you think this research is about?

How religious do you consider yourself?

Please indicate your age in completed years.

Please indicate your gender

- Female

- Male

- Other

Appendix M – Descriptive Statistics of Participants

Condition	Mean Belief in God Score	Standard Deviation of Belief in God Score	Mean Sense of Control	Standard Deviation of Control
[1] Past- no control	5.611111	1.195033	5.277778	1.526455
[2] Past- in control	4.894737	1.286457	5.000000	1.054093
[3] Present- no control	5.148148	1.709103	5.444444	1.525465
[4] Present- in control	4.966102	1.819114	5.186441	1.319281

Group Evaluation Confirmations

Thank you for completing the evaluation   Inbox ×

Eugen Dimant via qemailserver.com   10:21 PM (0 minutes ago)
to me

Ramakrishnan, Shruthi,

Thank you for completing the group evaluation for Behavioral Science: Theory and Application of Experimental Methods (Spring 2021).
Your response was recorded on Saturday, December 11th at 8:21 PM.

Please be sure to save this email and include it with your group's final project submission.

Eugen Dimant edimant@sas.upenn.edu via qemailserver.com
to me

Lewis, Michael D,

Thank you for completing the group evaluation for Behavioral Science: Theory and Application of Experimental Methods (Spring 2021). Your response was recorded on Saturday, December 11th at 8:38 PM.

Please be sure to save this email and include it with your group's final project submission.

Thank you for completing the evaluation   Inbox ×

Eugen Dimant via qemailserver.com   10:12 PM (33 minutes ago)
to me

Banerjee, Karuna,

Thank you for completing the group evaluation for Behavioral Science: Theory and Application of Experimental Methods (Spring 2021). Your response was recorded on Saturday, December 11th at 8:12 PM.

Please be sure to save this email and include it with your group's final project submission.

Thank you for completing the evaluation   Inbox ×

Eugen Dimant edimant@sas.upenn.edu via qemailserver.com   11:28 AM (0 minutes ago)
to me

Huang, Ori Maile,

Thank you for completing the group evaluation for Behavioral Science: Theory and Application of Experimental Methods (Spring 2021). Your response was recorded on Sunday, December 12th at 12:28 PM.

Please be sure to save this email and include it with your group's final project submission.

Eugen Dimant edimant@sas.upenn.edu via qemailserver.com   Sat, Dec 11, 10:22 PM (2 hours ago)
to me

Achrekar, Kahini,

Thank you for completing the group evaluation for Behavioral Science: Theory and Application of Experimental Methods (Spring 2021). Your response was recorded on Saturday, December 11th at 8:22 PM.

Please be sure to save this email and include it with your group's final project submission.

Thank you for completing the evaluation   Inbox ×

Eugen Dimant via qemailserver.com   10:24 PM (3 minutes ago)
to me

Williams, Meaghan Elizabeth,

Thank you for completing the group evaluation for Behavioral Science: Theory and Application of Experimental Methods (Spring 2021). Your response was recorded on Sunday, December 12th at 8:24 PM.

Please be sure to save this email and include it with your group's final project submission.

Authorship Contribution Statements

Kahini Achrekar - Conceptualization, Methodology, Formal Analysis, Writing - Original Draft, Writing - Review and Editing, Project Administration, Data Curation, Visualization

Karuna Banerjee - Conceptualization, Methodology, Writing - Original Draft, Writing - Review and Editing, Project Administration, Data Curation

Meaghan Williams - Methodology, Writing - Original Draft, Writing - Review and Editing, Project Administration

Michael Lewis - Conceptualization, Methodology, Writing - Original Draft, Writing - Review and Editing, Resources, Project Administration, Data Curation

Ori Huang - Conceptualization, Writing - Original Draft, Writing - Review and Editing, Literature Review, Project Administration

Shruthi Ramakrishnan - Methodology, Writing - Review and Editing, Literature Review, Project Administration