1) Have any data been collected for this study already?
It's complicated. We have already collected some data but explain in Question 8 why readers may consider this a valid pre-registration nevertheless.

2) What's the main question being asked or hypothesis being tested in this study?
1a. Potentiating dopamine via L-dopa will significantly increase harm-intent attributions made during the Helsinki Summit (a within-subjects dictator game) across all partners but not self-interest attributions, compared with placebo.
1b. Antagonising dopamine binding at D2 receptors via haloperidol will significantly decrease pre-existing high harm-intent attributions made during the Helsinki Summit (a within-subjects dictator game) across all partners but not self-interest attributions, compared with placebo.
1c. Dopamine manipulation will have no effect upon self interest attributions compared to placebo.

2a. Potentiating dopamine via L-dopa will significantly decrease the number of trials taken to trigger a high harm intent attribution (score > 60) made during the Helsinki Summit across fair and unfair trials but not self-interest attributions, compared with placebo.
2b. Antagonising dopamine binding at D2 receptors via haloperidol will significantly increase the number of trials taken to trigger a high harm intent attribution (score > 60) made during the Helsinki Summit across fair and unfair trials but not self-interest attributions, compared with placebo.

3) Describe the key dependent variable(s) specifying how they will be measured.
- Harm intent attributions will be scored via The Helsinki Summit. This within-subjects dictator assesses participants across three different partners in a dictator style game. Participants play each partner for 6 trials. In each trial, their partner decides whether to split or keep £0.10 with the participant. Participants will always play against one unfair (always keeps the money), one partially fair (keeps the money 50% of the time), and one fair partner (always splits the money). After each trial, participants are asked to judge to what degree their partner was motivated by a desire to earn more money (self-interest; scale 1-100) or a desire to reduce their bonus (harm-intent; scale 1-100).

- Self interest attributions will be scored via The Helsinki Summit (see "Harm Intent attributions" for how the attributions are measured)

- Paranoia: Green et al. Paranoid Thoughts Scale (Green et al., 2002). This scale assesses social and persecutory paranoia. We will sum both subscales to form a total score and use this in our analysis.

4) How many and which conditions will participants be assigned to?
Participants will take part in three conditions each in a randomised, double-blind placebo-controlled study design. Blinding will be prepared according to a Williams Square design. Participants will be randomly assigned to an order sequence of L-dopa, haloperidol, and placebo conditions. Order will be balanced across participants. The unblinded pharmacist dispensing drugs will be the only individual aware of the order participants are to be dosed.

5) Specify exactly which analyses you will conduct to examine the main question/hypothesis.
For all analysis we will use the ordinal package (Christensen et al., 2012) to construct nonparametric models unless otherwise stated.

Hypothesis 1:
We will initially conduct simple clmm models to understand the changes in Harm Intent and Self Interest attributions across drug conditions. This will analyse dictator types separately.

Harm Intention (unfair dictator) ~ drug condition (placebo/L-dopa/haloperidol) + (1|participant ID)
Harm Intention (partially fair dictator) ~ drug condition (placebo/L-dopa/haloperidol) + (1|participant ID)
Harm Intention (fair dictator) ~ drug condition (placebo/L-dopa/haloperidol) + (1|participant ID)

We will also repeat all of the above analyses with Self Interest as the dependent variable.
We will then conduct an exploratory model selection approach with model averaging using an increased number of explanatory variables:

e.g.
Harm Intention ~ drug condition (placebo/L-dopa/haloperidol) + paranoia + dictator (unfair>p;artially fair>fair) + (1|participant ID)
Hypothesis 2:
Both harm intent and self-interest attributions of participants will be set a value of 6 if they score 60 or over in their first trial, 5 if they score 60 or over by their second trial, 4 if they score 60 or more by their third trial, and so on. All trials following the threshold being reached will be coded as 0. Participants not reaching 60 for any trial will be coded 0 across all trials. Each of the following models will be conducted for fair dictators and unfair dictators separately.

We will then run simple clmm models to understand whether each drug influenced the trial at which a high harm attribution was made:

\[ \text{Trial score (HI)} \sim \text{drug condition (placebo/ldopa/haloperidol)} + (1|\text{participant ID}) \]
\[ \text{Trial score (SI)} \sim \text{drug condition (placebo/ldopa/haloperidol)} + (1|\text{participant ID}) \]

In addition, we will run an identical clmm. Instead, data will be coded to mark the trial in which participants reached their peak score. For example, if participants scored highest in round 6 they will be scored 1, if they scored highest in round 5 they will be scored 2, and if they scored highest in round 4 they will be scored 3, and so on. This will be conducted for fair and unfair dictators separately.

We will then conduct an exploratory model selection approach with model averaging using an increased number of explanatory variables:

e.g.
\[ \text{Trial score (HI)} \sim \text{drug condition (placebo/ldopa/haloperidol)} + \text{paranoia} + \text{dictator (unfair>partially fair>fair)} + (1|\text{participant ID}) \]

6) Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.
We will deal with outliers like so:
Those who miss test sessions:
Intent to treat analysis: Our primary analyses will include all those who were randomised and completed at least one test session.
We will run analyses on specific hypotheses of interest with anyone who completed at least one placebo and one active drug condition.
Those who miss questionnaire items:
Their data for that questionnaire will be excluded, however, they are unlikely to miss questions as online questionnaires require that participants fill out all items before moving to the next segment.
Those who fail comprehension questions:
Participants who fail both comprehension checks on the Helsinki Summit will be excluded from the analysis.

We will include participants:
- Aged between 18-65
- UK residents
- Fluent in English
- No previous history of mental health diagnoses
- No previous history of neurological disorder
- In good health as confirmed by a physician in a screening session and before each study session.

7) How many observations will be collected or what will determine sample size? No need to justify decision, but be precise about exactly how the number will be determined.
Using G*Power (Faul et al., 2016) – using a mixed within-subjects ANOVA, within-factors estimates with one group completing 3 separate measures, alpha = 0.05, and beta = 0.90. All ICC estimates are 0.5 to be conservative. This estimated our sample required to be 25 for an effect size sensitive at 0.3.
We will aim to randomise 30 individuals in order to achieve a minimum of 25 completers (participants complete all trials).

8) Anything else you would like to pre-register? (e.g., secondary analyses, variables collected for exploratory purposes, unusual analyses planned?)
While we have begun data collection the study is double blind and randomised. Therefore, as we are preregistering before unblinding we are confident our predictions are valid.
We would also like to test the effect of drug effects on total self-relevance, interest, and agreement total ratings across the total BVI as a summary score.
We are also collecting data on general salience attribution using the Salience Attribution Test (SAT; Roiser et al., 2009), schizotypy traits with the Brief O-LIFE (Mason et al., 2005) and general personality dimensions using the OCEAN 5-factor personality measure (Goldberg & Lewis, 1992).
We wish to run exploratory analyses that aim to understand how personality (total score and each individual subscale separately) and schizotypal traits (total score and each individual subscale separately) in addition to drug condition may influence scores on the SAT, Helsinki Summit, and the BVI.