Reviewer's report

Title: Impaired social decision making in patients with major depressive disorder

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Reviewer: Zsolt Unoka

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Review
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Journal: BMC Psychiatry

Manuscript Summary

In this manuscript, the authors examined whether patients with major depressive disorder show abnormalities in decision-making behavior in a social interactive context, in which their decisions have actual consequences, by investigating their acceptance rates in the ultimatum game. Their results showed that (1) the acceptance rates of the MDD patients were lower than those of the normal controls, and (2) no differences in acceptance rates to unfair proposals were observed in the MDD group while comparing their response to offers from humans with those from computers. Taken together, their findings indicated that the MDD patients showed impaired bargaining behavior when playing the ultimatum game. Twenty-three participants (N=19) (14 with MDD, 19 healthy controls) were recruited. MDD patient were in the clinical range (mean HDRS score =21) and did not suffer any co-occurring mental disorder. There were not significant differences between the two group regarding age, gender, years of education and IQ (measured by Digital Symbol and Information subtests of the Wechsler Intelligence Scale for Adult-Chinese Revised). Participant played the role of responders 36 times in one shot Ultimatum Game, during which they played with a computer (18 times) or with a person (18 times). The participants were informed that proposals had been submitted from real persons, and the proposers were represented by alphanumerical codes, to exclude the confounding effects of facial traits or names. They independently manipulated fairness (fair: 50%-40% of the stake; unfair: 33%-25% of the stake; most unfair: 20%-10% of the stake) and monetary reward (two offer size:#10,#4). To sum, their study was a 2×2×2×3 design, with diagnosis (MDD, NC) as a between-subjects factor and proposer (human, computer), offer size (#10,#4) and fairness (50%-40%, 
33%-25%, 20%-10%) as within-subjects factors. After completing the UG task, the participants rated the fairness of all offers presented in the UG task on a Likert scale of 1 (very unfair) to 7 (very fair), in order to ensure that the participants’ fairness evaluation criterion was consistent with the authors’ classification standards. Immediately before the UG task, the depressive symptoms of the participants were rated by an experienced research physician using the 24-item Hamilton Depression Rating Scale.

Strengths

The strengths of the manuscript include the importance of the research question being examined and the important implications of the findings for understanding interpersonal difficulties associated with MDD. Additionally, the authors use innovative experimental psychopathology lab-based procedures for examining potential mechanisms involved in monetary decision making. A further strength of the manuscript is that the authors matched participants for gender, age, IQ and years of education. Furthermore, the participants played the game both with human partners and with computer partners, and to avoid mixing fairness and monetary reward they kept the offer size stationary, so they could isolate effects of fairness and the size of the offer separately, which has typically not been done in past MDD studies. Finally, the manuscript is generally well written.

Weaknesses

There are a few aspects of the manuscript that have been identified as weak. We will just name the major issues in this section but will go into more detail about them and raise other concerns below. First, the N is small (only 14, 19). Second, the MDD were diagnosed by experienced research physicians, but the diagnostic procedure and the inter-rater reliability of the research physicians were not reported. Third, it was not reported the assessment procedure of the mental status of the control subjects. Fourth, the socio-economic statuses of the participants were not reported. It is not clear for a general reader that how does the offered amount of money (#10, #4) relate to the general salary of the participants.

Summary

The topic of the present study is highly relevant and well performed. The literature review is cogent. The authors do acknowledge the limitations of their study. The question posed by the authors is well defined. The methods appropriate and well described. The data are sound. The manuscript is adhere to the relevant standards for reporting and data deposition. The discussion and conclusions are well balanced and adequately supported by the data, but social cognitive relevance of the design and the results are missing from them. The limitations of the work are clearly stated. The authors clearly acknowledge previous works on UG studies in MDD. The title and abstract are accurately convey what has been found. The manuscript is well written and concise.

Specific comments:
Introduction
The authors do a nice job of highlighting some of the inconsistencies in past research examining decision making abilities in social interaction contexts in MDD and pointing out potential reasons behind these inconsistencies.

Major Compulsory Revisions: However, one area that could be improved is the theoretical context provided in the beginning of the introduction. Specifically, we felt that the discussion of a social cognitive model of the Ultimatum Game and altruistic punishment and its relevance for MDD was missing. Since one of the main novel findings of the research is that no differences in acceptance rates to unfair proposals were observed in the MDD group while comparing their response to offers from humans with those from computers the whole paper overall could benefit from further elaboration and reference to the specific theoretical conceptualizations of social cognition and how they specifically relate to decision making in social interaction context in MDD. We also think the reader would benefit from a more specific description of social-cognitive deficits in MDD.

Method
Major Compulsory Revisions:

The description of diagnostic procedure, physicians’ inter-rater reliability and the assessment of controls’ mental state could improve the paper. With regard to the procedures section, the authors should provide more details about the following: Were participants run in groups or individually? Were participants able to discuss the research experience with other participants, especially MDD patients from the same department? Socio-economic status and average salary (in #) of the participant were not reported. These are all important pieces of information that need to be described.

In reading the authors’ description of the UG task, two questions came to mind. First, what was the rationale for that the participants were given an unlimited amount of time to decide in UG task? Second, what was the rationale for presenting 18 rounds? Although the UG is a well-known paradigm, this specific paradigm has not yet been utilized so the authors need to be clear about the scientific rational at each step of the procedures.

Results
Overall, we thought the authors did a good job of clearly presenting their results.

Major Compulsory Revisions: It needs explanation why they did not report the highly relevant results about the propositions that made by the patients in the proposer role.

Discussion
Major Compulsory Revisions: In the top of page 15, the authors fail to discuss that the most unfair offers made by the human partners were accepted at a significantly lower rate than the same offers made by the computer partners in the NC group when the offer size was smaller, but no differences between human and computer partners were found when the offer size was bigger.
The social-cognitive relevance of the indifference to the proposer’s status (human versus computer) in MDD is not discussed appropriately. Fairness and cooperation in depression is highly relevant topic.

**Level of interest:** An article of importance in its field

**Quality of written English:** Acceptable

**Statistical review:** Yes, and I have assessed the statistics in my report.

**Declaration of competing interests:**

'I declare that I have no competing interests'