Reviewer's report

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

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Reviewer: Rene Hurlemann

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Overall impression:
The reported study investigates possible changes in social decision making in patients suffering from major depressive disorder (MDD). By applying a well-established neuroeconomic task, the ultimatum game (UG), the authors revealed aberrant behavioural responses in MDD as compared to healthy controls. More precisely, the authors observed lower acceptance rates of unfair offers in MDD patients. Furthermore MDD patients showed similar reactions to unfair proposals made by either a computer or a human partner, while healthy controls treated those proposals discriminatively. In summary, this study addresses an interesting research question, which is well derived from previous findings. The methodical approach is sound and is described in adequate detail. Moreover, the convincing results extend previous experiments by controlling for the moderating influence of monetary reward. Within the discussion section, the majority of conclusions are well-balanced and supported by data. General strengths of the study include the well-matched healthy control group and the well-structured and detailed results section (e.g. the calculation of effect sizes for every statistical test). There are a number of limitations, however, which are described in the following. Taken together, the manuscript appears to be worth publishing and appears to adequately meet the scope of the journal. The length of the manuscript is appropriate, considering its content.

Major issues:

Abstract:

1) “Abnormal decision-making processes have been observed in patients with major depressive disorder (MDD). However, whether MDD patients show abnormalities in decision making in a social interaction context, in which decisions have actual consequences, is unresolved.” The meaning of “actual consequences” is not deducible from the theoretical background: are you referring to the monetary reward? Please clarify this point, especially regarding the difference between consequences of normal vs. social decision making.

2) “Negative bias, an abnormal affection cognition, exists in decision making in a social interaction context in MDD” Please define the term “affection cognition”. As far as I can see, this term is not explained throughout the text.

Background:
3) “Decision making is a major part of day-to-day life. This is true even for patients with major depressive disorder (MDD),...” To my knowledge there is no obvious reason to believe that decision making would play no central role in MDD patients. Please provide more evidence supporting your point of view, otherwise it appears slightly construed.

4) The 2-round UG game, as mentioned on page 4, lacks an explanation.

Methods

5) To me the sample size of N=33 (14MDD; 19NC) seems quite small considering the chosen 2x2x2x3 design and might therefore not allow a sufficient statistical power to detect existing effects. This point should be included in the discussion of limitations.

6) The design and importance of the WAIS-RC's subscales should be elucidated more precisely. From my point of view, the Digit Symbol test primarily measures memory and speed of processing, but not so much speed of “reaction”.

7) To prevent misunderstandings, it might help to change 90s to 90 seconds (P.7)

Results

8) Please provide a more precise description of your clinical population, for example regarding the patient’s profile, history of depressive episodes, and medication.

9) “Major depressive disorder patients (MDD) and normal controls (NC) were significantly similar in terms of gender composition, age, and educational level (p’s > .05).” There is no ‘significantly similar’; please provide a statistically correct statement.

10) "(p's <.05)" would indicate a genitive case and is not an appropriate abbreviation for several p-values. Please replace by "p < .05".

Discussion

11) “Our study showed that persistent sadness seemed to alter the behavioral pattern of MDD patients in their social interactions, a finding which provides further evidence supporting the role of emotion in decision making” There are no data mentioned, substantiating the conclusion of a relation between sadness and social interacting behavior (page 13). Please provide details on your operationalization of sadness and your statistical analysis, respectively.

12) “Particularly, Moretti et al. (2009) found that ventromedial prefrontal cortex (vmPFC) patients substantially reduced their acceptance rate of unfair offers from a human partner compared with controls [47]." 

"vmPFC" is not a formal diagnosis, please clarify which disorder or disease you refer to (I assume you talk about patients with lesion in vmPFC).
13) More importantly, the discussion on the neural substrates of decision-making should incorporate more recent studies on functional imaging data. For instance, ... Scheele et al. (2012) demonstrated that an intact amygdala is required for a “normal” behaviour in the UG.

14) Please cite and discuss the article by Scheele et al. (2013) A negative emotional and economic judgment bias in major depression.

Minor issues

Besides the above-mentioned suggestions regarding the study’s content and design, the manuscript would definitely benefit from a linguistic revision. Some exemplary phrases, which do not sound familiar to me, are the following:

15) P. 3: “A universal in human social interaction is the tendency to respond with immediate aggression to a perceived threat or unfairness”

I do not understand the exact meaning of this sentence.

16) P. 5: therefore this possibility has been never explored

Please change to “has never been explored”.

17) The term “social interaction context” is not used consistently (e.g. “social interactive context”, P. 12).

18) “abnormal affection cognition”: the term’s meaning remains unclear.

Level of interest: An article of importance in its field

Quality of written English: Needs some language corrections before being published

Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:

I declare that I have no competing interests.