In this project about tactile mirror system in BPD patients, Zazio and colleagues are going to collect data from 44 participants (22 BPD patients, 22 HC subjects). Participants will be asked to perform a tactile acuity task (2-PDT) and a visuo-tactile spatial congruity task (VTSC) twice, before and after cmPAS protocol. In the cmPAS paradigm, participants will be provided with a single-pulse TMS over S1 while watching videos of virtual hand being touched. This procedure should lead to an increment of the tactile mirror capabilities in HC that would manifest with a possible better/worse performance in 2-PDT and VTSC tasks, respectively, in the second session than in the first session. Authors, however, do not expect the same plasticity in the tactile mirror system due to cmPAS in BPD patients. This expectation would be justified by the reduced empathic abilities of BPD patients, already proven in the literature. I have some minor questions about the paradigms (which could be useful for future research) and statistical analysis which I listed below. However, I think that authors provided a well-structured design both in terms of validity of research questions and hypothesis, experimental procedure and statistical planning. Therefore, my opinion is more than positive.

1. In the VTSC paradigm, the virtual hand is palm up and it receives the tactile stimulation on the palm. On the contrary, the real hand is palm down. Actually, I did not understand where the real hand receives the tactile input (palm or dorsum). You wrote palm in the text, but it seems dorsum in the figure. Please this issue should be clarify. Even if the real tactile stimulus is delivered on the palm (in line with the virtual hand), the real hand is palm down because of the manual response with the keyboard. Is this procedure the most ideal to obtain reliable results? Wouldn’t be better to have the very same configuration of the virtual hand and real hand (e.g., both virtual hand and real hand palm up)?
2. The response in the VTSC task is provided with the right hand; however, the response (right) hand receives the tactile stimulation in half of the trials. A pedal response (provided by foot) would have been better since no conflict arises between the stimulation and the response. Could you justify this choice? Moreover, it is not clear which are the fingers of the right hand used for the response.
3. In the cmPAS paradigm, the fixation hand lasts more than 9 seconds. I see that this trick avoids a possible summation of excitatory inputs due to repeated pulses of TMS over time, but I think that participants could have a ‘weird’ visual experience due to the (very) long fixation and the (relatively) brief touch. Why did not you add an ITI between trials to make the fixation shorter?
4. In the cmPAS protocol, it is not clear how authors will find the targeted area S1 (if they have specific coordinates from the literature or if they follow other procedures). Maybe this information is not needed in this first version of the manuscript.
5. Why did not you opt for a 2x2x2 design in the final ANOVA with between-subj factor Group and within-subj factors Time and ISI? I do not understand your choice to split the final analysis in two parts, depending on the results of the first.
6. To make your final results more robust, you could support the frequentist statistics with bayesian statistics.