

### ***General comments***

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We thank the reviewers for providing additional constructive feedback about our revised plan and manuscript.

Since the last review, we conducted a pilot study with a convenience sample of N=122 subjects using the proposed measures. We revised the power analysis to include the estimates from the pilot results. The pilot data and analyses are available on OSF.

We also added a mediation analysis to the analysis plan. In the pilot study, we found an overall correlation between creativity and depression, but creativity was not a predictor of depression when rumination was controlled. In this situation, it would be useful to know whether rumination could potentially account for the observed relationship between creativity and depression. A mediation analysis using creativity as DV, rumination as mediator, and depression as DV would provide additional information. A significant indirect effect would indicate that at least some of the overall relation between creativity and depression could be explained by rumination. This is useful information even if we cannot make any strong causal claims. This could not be concluded from a null relation between creativity and depression in the multiple regression analysis.

### ***Reviewer 1, 25 May 2022***

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I appreciate the effort the authors put into this revision of their submission. Several of my earlier points (overview of creativity research, assessing reappraisal ability, quality control of data) are now sufficiently addressed and make me confident in the study protocol. The authors' constraints on the time and financial aspects of the online assessment are understandable and I agree with their vote of confidence that a sample of  $n = 200$ , even if not able to test for small effects, may still provide a valuable contribution to literature. Therefore, I recommend that authors move on to stage 2.

Thanks for the response and the constructive feedback on the earlier versions.

### ***Reviewed by Kate Button, 06 Jul 2022 14:47***

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Thanks for the opportunity of reviewing this stage 1 RR. The authors have clearly worked hard and made several changes to the manuscript. I have a few comments, however, which I hope they find useful.

The introduction and rationale is much clearer but I still have a few comments. The authors bring in a range of evidence linking creativity to depression but as they acknowledge creativity is a very broad concept which can be defined in several ways, and the evidence for an association is mixed. It would be helpful if more context were given to the individual studies cited to show how they measured creativity – as the authors are specifically looking at divergent thinking as a component of creativity then perhaps more weight should be

given to findings from studies using similar measures. Indeed, I wonder whether the rationale could focus even more directly on divergent thinking.

The introduction has been revised to focus strictly on divergent thinking. We have clarified that divergent thinking is our only primary focus. Still, when looking at findings from studies that investigated divergent thinking only, the present literature shows mixed results. We have also clarified the divergent thinking measures that the studies have used as a potential reason for the mixed findings.

I also think that issues of confounding haven't been sufficiently considered in places. For example, rates of depression higher among art students, than science students – have the authors considered / or did the original work consider other differences between these two groups that could account for this difference?

The literature about art vs science has been removed since we will not follow up on this area of research. The introduction now only focuses on correlational studies that investigated the topic with divergent thinking and depression.

The authors state “Creativity is usually regarded as a strength and an advantageous trait, but there may also be drawbacks to being creative. One potential drawback is that creativity may be associated with emotional instability and mental disorders.” My reading is that the authors predict that if an association between depression and creativity exists at all, it is not causal but instead is the result of confounding by rumination and reappraisal, so perhaps this could be more nuanced?

This sentence has been rephrased: “Creativity is usually regarded as a strength and an advantageous trait, but studies have found it to be correlated with emotional instability and mental disorders (e.g. Ludwig, 1992; MacCabe et al., 2018; Papworth et al., 2008; Taylor et al., 2017). Hence, this study seeks to investigate and explain how creativity and depression are related.” This sentence has a more open-ended meaning that introduces the next section of “Creativity and Depression – Empirical evidence”.

#### Methods:

The authors mention this is an epidemiological study, not a diagnostic one several times. I'm not sure what this means – we often use diagnosis in epidemiology to ascertain the absence/presence of disease. They might find this series in the BMJ helpful: <https://www.bmj.com/about-bmj/resources-readers/publications/epidemiology-uninitiated/1-what-epidemiology> . I understand the rationale for looking at the variation of depression scores in the general population.

The description of “epidemiological study” has been removed to avoid confusion. We were using this term to convey that we are investigating the normal variation of depression scores in the general population, and measuring history/tendency toward depression, rather trying to identify individuals currently suffering from clinical depression that would need to be referred to treatment.

A key thing in epidemiology is defining one's population of interest. Another is to think about the generalisability of findings (to other populations). To do this it often helps to

measure several participant characteristics at baseline (I suggested this previously). In this case medication status and whether they are currently receiving psychotherapy for depression seems really important to anyone reading this with an interest in depression. Employment status (student, employed, NEET) and profession (arts, science), as well as the usual age, gender, ethnicity/nationality ect. would also be useful for providing context - I'm not suggesting additional analyses but rather providing a detailed overview of the people recruited so that readers can decide whether the findings are generalisable to their population of interest. Also, if publishing data open these could be very useful for future meta-analyses.

We have included more demographic questions in the survey, as described below. We will only use gender for our main analysis, but will report descriptive statistics for other variables, and include all variables in the final archived data set.

Age:

1. 18-24 years old
2. 25-34 years old
3. 35-44 years old
4. 45-54 years old
5. over 55 years old

Gender:

1. Male
2. Female
3. Other/Prefer not to say

Race/Ethnicity:

1. American Indian or Alaska Native
2. Asian
3. Black or African American
4. Hispanic or Latino
5. Native Hawaiian or Other Pacific Islander
6. White
7. Mixed ethnicity

Occupation

\*For students, please select the industry that best describes your field of study.

\*For those who are unemployed/ retired, please select the industry that best describes your previous job.

1. Architecture and engineering
2. Arts, culture and entertainment
3. Business management and financial services
4. Community and social services
5. Education
6. Science and technology
7. Sports and fitness
8. Installation, repair and maintenance
9. Industrial manufacturing

10. Farming, fishing and forestry
11. Food preparation and serving
12. Government administration and law enforcement
13. Health and medicine
14. Legal and public policy
15. Sales
16. Other: \_\_\_\_\_

The authors are only using a few items from each of the measures they use – is this justified? What will they do with the remaining items? Do they need to collect all of them?

We selected specific items for analysis because only those items are relevant to our hypothesis. The practice is similar to the other studies (e.g. Cohen & Ferrari, 2010; Joormann & Gotlib, 2010; Nolen-Hoeksema, 2012; Treynor et al., 2003; Verhagehen et al., 2005; 2014), which also only analysed the subscales that are relevant to their research.

It is essential to collect responses of other items in order to follow the standard protocol of each questionnaire as closely as possible and maintain reliability. Including the other items also prevents participants from fully knowing what is being tested and reduces subject biases.

The items not used for analyses will still be part of the archived data.

For the analysis for hypothesis 3, is there a reason for including self-rumination in the model? This could be explained.

We included self-reflective rumination in the third analysis because we expected self-reflective rumination to influence the relationship between creativity and depression. Keeping self-reflective rumination in the analysis could take its influence into account when testing whether an additional factor, reappraisal frequency, also explains some variance.