Assignment Methods III

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1. Assessment of presented methods

The methods of the presented study have several flaws that reduce its ability to arrive at causal conclusions, as it is not conducted as an experiment.

First of all, the selection of participants and their assignment to the groups does not control for possible confounding variables. On the contrary, it rather creates space for such variables to influence the findings. As the participants are drawn from different pools, they do not represent the same population but different groups of students. That might be not a fatal problem if participants were randomly assigned to groups to control for systematic differences. But instead, the meditation group was sampled in a different way and from a different population. This could for example introduce problems, if psychology students (in the other two groups) in general had a better or worse capacity of working memory compared to the general student population. The lack of control for confounding variables impedes causal interpretations, as differences in outcome might be confounded by systematic differences between the groups, instead of being caused by the intervention.

Another problem is that the intervention is not actively manipulated. Therefore, a before- and after-treatment measurement is not possible. This hinders to arrive at a conclusion about the temporal precedence of the treatment to the measured outcome.

Threats to construct validity can be found in relation to the research question and the applied measurement. The research question implies certain mechanisms that are assumed to underlie the relationship between treatment and outcome, specifically the absence of anxious, distracting or intrusive thoughts. However, only one measurement of working memory capacity is performed. This is a very limited operationalization of working memory in general and does not account for the assumed underlying processes. Another threat to construct validity is that the treatments are defined very loosely. No specific mindfulness apps or exercises are specified, allowing for a big variation between subjects within the same condition. Also, while the research question specifies the use of such apps for “approximately 5 minutes per day”, participants are included that – based on their own judgement – use these apps “sometimes”. This rating is first of all very subjective, in this context “sometimes” might be interpreted in quite different ways. Also, it lies right in the middle between “never” and “everyday” on the Likert scale, suggesting that it could for example be interpreted as “one time in two weeks”, which drastically contrasts the research question. The same applies to the meditation condition.

External validity is also threatened by the sampling of the groups. Even within “students” it is hard to generalize these findings, as different groups are included without random assignment. In lack of more specific information about the treatments (e.g., which app has been used) it is also problematic to generalize these results to meditation or mindfulness apps in general.

1. Improvement of methods

To arrive at causal conclusions, the study has to be modified in several ways. All

participants need to be sampled from the same basic population, for example “psychology students”. Then, all participants should be assessed for their prior use of meditation or mindfulness apps, to only include subjects that have not used these methods before. This is needed to effectively measure the effect of the treatment. Included students need to be randomly assigned to the three groups: control vs. meditation vs. mindfulness app. Before the treatment begins, each subject is measured in terms of working memory capacity and - to account for the mechanisms proposed in the research question – occurrence of anxious, distracting or intrusive thoughts. These additional measurements can later be analyzed to gain further insight into their interrelationship with treatment condition and working memory capacity. In each group, the intervention needs to be standardized and in line with the research question. Therefore, use of the meditation app for 5 minutes a day and attendance of one 45 minute long meditation session each week should be clearly defined and if possible controlled, for example using attendance lists at meditation meetings.

The control condition should feature a comparable intervention that is not assumed to alter working memory, for example playing some sort of videogame for 5 minutes a day. Also, members of this condition should be asked at each measurement whether they used mindfulness apps or meditations, to exclude subjects that engaged in one of the interventions outside of the study.

The measurement should then be repeated after a reasonable time for the interventions, for example after three months. Alternatively, the measurement could be performed more often to gain a more detailed insight into the time course of intervention effects.

These changes to the study design should account for most of the discussed threats to causal inference and construct and eternal validity. Sampling from a common population, random assignment to intervention, active manipulation of intervention and repeated measures help to control for confounders, increase generalizability and help to understand the relationship between intervention and outcome – for example, whether temporal precedence can be assumed. To further increase validity, more drastic changes could be applied. For example, subjects could be sampled from a larger and more general population, more interventions could be added to investigate and compare the effects of different apps or exercises, and outcome measures could be extended in accordance with the research question. Some of these changes would require higher amounts of resources, for example if more subjects or measurement time-points were to be included. Thus, after applying the necessary changes described earlier, additional changes could be applied to further improve the study in the frame of available resources.