



REPLY TO MAROT ET AL.:

The struggle to comply with social-distancing is multifaceted, as are the ways of mitigating it

Weizhen Xie (谢蔚臻)^{a,1} and Weiwei Zhang^b

We thank Marot et al. (1) for their reproduction of our findings on depressed mood and social-distancing compliance, as already shown in our tables 1 and 2 and *SI Appendix* tables S2 and S3 (2). Their reanalysis of our data appears to support three additional points: Depressed mood is a 1) more relevant but 2) indirect predictor of social-distancing compliance, and therefore, 3) mood-related interventions may facilitate people's social-distancing compliance.

Regarding the first point, our goal was never to explore which factor can best predict social-distancing compliance. Our study was driven by prior research that associates cognitive variables with people's early responses to a pandemic (3, 4) and their willingness to follow a set of established social rules (5). Our goal was therefore to reveal the critical role of working memory in social cognition, especially in people's early responses to the COVID-19 pandemic. In this regard, clarifying how working memory contributes to social-distancing compliance after considering well-established psychological and socioeconomic factors (with their effect sizes shown in our tables 1 and 2 and *SI Appendix* tables S2 and S3) is both appropriate and necessary.

Regarding the second point, the full mediation effect presented by Marot et al. reinforces that social-distancing compliance at the initial phase of the pandemic is an outcome of a deliberate thought process (3, 4), more so than a direct affective response. While depressed mood is associated with various cognitive biases and lower working memory capacity (6–8), it does not always account for behavior in social interactions.

For example, Marot et al. neglect to consider that depressed mood does not predict compliance with the fairness norm, whereas working memory capacity does (per our *SI Appendix* table S6). Future research should examine how these cognitive and affective factors jointly influence people's everyday decisions.

Regarding the third point, our article states that our observations are correlational in nature. Any causal statement, such as the assertion that higher working memory capacity or less depressed mood has increased social-distancing compliance, is unwarranted and misleading. We agree with Marot et al. that mood-related interventions may be more related to psychological well-being during the pandemic, as suggested by one of our previous studies (9).

We take this opportunity to emphasize that people's responses to a public health crisis are unlikely to be driven by a single factor, and that efforts to mitigate the struggles should therefore be multifaceted. As cognitive, affective, personality, and socioeconomic factors are associated with people's behaviors at various stages of the pandemic (2, 4, 10), it is paramount to take multiple approaches to address the dissonance between following safety measures and pursuing social needs. Although what we know is far from enough to resolve the current crisis, in light of our observations, practices such as minimizing information overload, retaining guideline consistency, and removing disinformation have become even more critical during this challenging time (11).

- 1 M. Marot, J. Chevalère, N. Spatola, Depressed mood, a better predictor of social-distancing compliance and candidate for intervention compared to working memory capacity. *Proc. Natl. Acad. Sci. U.S.A.*, 10.1073/pnas.2024017118 (2021).
- 2 W. Xie, S. Campbell, W. Zhang, Working memory capacity predicts individual differences in social-distancing compliance during the COVID-19 pandemic in the United States. *Proc. Natl. Acad. Sci. U.S.A.* **117**, 17667–17674 (2020).
- 3 T. C. Reluga, Game theory of social distancing in response to an epidemic. *PLOS Comput. Biol.* **6**, e1000793 (2010).

^aNational Institute of Neurological Disorders and Stroke, National Institutes of Health, Bethesda, MD 20892; and ^bDepartment of Psychology, University of California, Riverside, CA 92521

Author contributions: W.X. and W.Z. designed research; W.X. performed research; W.X. contributed new reagents/analytic tools; W.X. analyzed data; and W.X. and W.Z. wrote the paper.

The authors declare no competing interest.

Published under the [PNAS license](#).

¹To whom correspondence may be addressed. Email: weizhen.xie@nih.gov.

Published February 10, 2021.

- 4 J. Lammers, J. Crusius, A. Gast, Correcting misperceptions of exponential coronavirus growth increases support for social distancing. *Proc. Natl. Acad. Sci. U.S.A.* **117**, 16264–16266 (2020).
- 5 A. Morris, F. Cushman, A common framework for theories of norm compliance. *Soc. Philos. Policy* **35**, 101–127 (2018).
- 6 W. Xie, H. Li, Y. Zou, X. Sun, C. Shi, A suicidal mind tends to maintain less negative information in visual working memory. *Psychiatry Res.* **262**, 549–557 (2018).
- 7 W. Xie, A. Berry, C. Lustig, P. Deldin, W. Zhang, Poor sleep quality and compromised visual working memory capacity. *J. Int. Neuropsychol. Soc.* **25**, 583–594 (2019).
- 8 W. Xie *et al.*, Schizotypy is associated with reduced mnemonic precision in visual working memory. *Schizophr. Res.* **193**, 91–97 (2018).
- 9 K. Sweeny *et al.*, Flow in the time of COVID-19: Findings from China. *PLoS One* **15**, e0242043 (2020).
- 10 J. A. Weill, M. Stigler, O. Deschenes, M. R. Springborn, Social distancing responses to COVID-19 emergency declarations strongly differentiated by income. *Proc. Natl. Acad. Sci. U.S.A.* **117**, 19658–19660 (2020).
- 11 W. Xie, S. Campbell, W. Zhang, The struggle to comply with social distancing. *TheScienceBreaker*, doi.org/10.25250/thescbr.brk422 (2020).