

Higher education predicts global cultural similarity to WEIRD countries

Corresponding Author: Dr Cindel White

This file contains all reviewer reports in order by version, followed by all author rebuttals in order by version.

Version 0:

Reviewer comments:

Reviewer #1

(Remarks to the Author)

This is a beautifully written and carefully constructed paper with broad implications across multiple disciplines. The introduction does an excellent job setting the stage, and the analyses are rigorous and timely. I believe this work will be highly influential, particularly as scholars across psychology, political science, economics, sociology, and philosophy are increasingly engaging with the “WEIRD” problem. The use of a large, cross-national sample combined with a formal measure of cultural distance is a notable strength, and the findings raise important questions about who is typically represented in cross-cultural research. I offer the following comments in the spirit of constructive engagement. I hope the authors find them helpful as they continue to refine the manuscript.

Major Comments:

1. Is the link to WEIRD tautological?

Given that “Educated” is embedded in the WEIRD acronym, is there a risk that the central finding is tautological? While Henrich et al. (2010) were clear that WEIRDness refers to a psychological profile rather than just demographic descriptors, it would be useful for the authors to explicitly address this point. How does the effect of education compare with other dimensions of WEIRDness? This would help disentangle education from the broader (rhetorical) construct of WEIRD.

2. The role of political ideology

Related to my previous point, work by Talhelm (2018) suggests that political liberals across cultures may be more psychologically WEIRD. Could political ideology, rather than education per se, be driving some of the cultural convergence observed in the data? Clarifying this would strengthen the argument. If possible, including political orientation as a covariate or exploratory moderator could be informative.

3. Accessibility of CFST

The use of the CFST is an innovative methodological contribution, but many readers outside of population genetics or cultural evolution may be unfamiliar with it. A brief, intuitive explanation—perhaps with a visual or mathematical summary—would make the measure more accessible to a broader social science audience.

4. Consequences for the questions we ask

The authors highlight that over-reliance on highly educated samples may distort our picture of global psychological variation. Specifically, the authors mention, “One important implication of these results is that cross-cultural studies that primarily rely on university-educated populations over-represent cultural values that are typical of WEIRD countries; many highly educated samples from countries around the world are as culturally similar as other WEIRD countries.” I agree. I would encourage them to push this idea further. If typical subject pools systematically over-represent WEIRD-aligned cultural values, does this shape the kinds of research questions and theories that become dominant? A brief reflection on how sample composition can influence the epistemic direction of a field would be valuable. In other words, “What would the field look like if our ‘typical’ samples were non-educated?”

5. Clarify the mechanism

The discussion of cultural transmission hints at essential processes, but the “how” remains somewhat underspecified. Are the authors envisioning social learning within educational settings, institutional selection effects, or something else? More explicitly articulating the proposed mechanism(s) would improve the paper’s power.

Minor Comments:

1. Please clarify how “values” are operationalized in the World Values Survey, particularly in relation to “moral values” and the literature on psychological WEIRDness (e.g., Atari et al., 2023).
2. In the first paragraph, where the authors discuss global psychological variation, consider referencing cognitive measures in addition to personality, motives, and values (e.g., Talhelm et al., 2014).
3. On page 5, when discussing socioeconomic status (SES), parental education is notably absent. Given its importance in shaping psychological development (see Miyamoto et al., 2018), it may be worth including or at least noting.
4. Figure 3 is difficult to interpret. Please consider enhancing the figure legend, adding more detail to each panel, or including a clearer narrative in the caption to help guide the reader.
5. While the world is arguably becoming more educated, it is less clear whether it is becoming more psychologically WEIRD. A discussion of these two diverging (or converging) trends in the Discussion section could enrich the broader implications.
6. On page 11, the statement, “The effect of income is consistent with some new findings arguing for a cultural amplifying effect of wealth [60],” is underdeveloped. Consider either elaborating on this claim or removing the sentence altogether.

Literature Cited

- Atari, M., Haidt, J., Graham, J., Koleva, S., Stevens, S. T., & Dehghani, M. (2023). Morality beyond the WEIRD: How the nomological network of morality varies across cultures. *Journal of Personality and Social Psychology*, 125(5), 1157.
- Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The weirdest people in the world?. *Behavioral and brain sciences*, 33(2-3), 61-83.
- Miyamoto, Y., Yoo, J., Levine, C. S., Park, J., Boylan, J. M., Sims, T., ... & Ryff, C. D. (2018). Culture and social hierarchy: Self-and other-oriented correlates of socioeconomic status across cultures. *Journal of personality and social psychology*, 115(3), 427.
- Talhelm, T. (2018). Hong Kong liberals are WEIRD: Analytic thought increases support for liberal policies. *Personality and Social Psychology Bulletin*, 44(5), 717-728.
- Talhelm, T., Zhang, X., Oishi, S., Shimin, C., Duan, D., Lan, X., & Kitayama, S. (2014). Large-scale psychological differences within China explained by rice versus wheat agriculture. *Science*, 344(6184), 603-608.

(Remarks on code availability)

The code does not seem to be available. The linked OSF repo says "This folder is empty."

Reviewer #2

(Remarks to the Author)

The authors report results from analyses of WVS data to test whether people who are more educated are more similar in their psychology to those living in WEIRD societies. The question is both of theoretical interest and one with important practical methodological implications for cross-cultural research, including the suggesting some caution in the interpretation of similarities across global samples. The authors find consistent evidence that people higher in education are more psychologically similar to the average psychology of WEIRD societies. These results appear to be robust, although I'll note I'm less familiar with the statistical approach used here. Interestingly the authors find that other markers of social class, like subjective status or income do not seem to have a similar relationship to cultural distance from WEIRD societies, an intriguing secondary finding. One that poses a bit of a puzzle perhaps, but that also helps pinpoint the role of education rather than other often confounded factors like income, in driving this pattern of results. In general I find the work to be compelling, likely to be of broad interest, and at least as far as I can tell methodologically and statistically sound. The paper is also well-written, the logic easy to follow, and it's well organized. Overall I like this a lot.

Bottom line, I believe this manuscript could be published in its current form and meets the high bar for this journal. My only potential suggestion that might improve this piece, which the authors and editors can feel free to disregard, is that it would be useful to have some sense of standardized effect size for the key findings in order for the reader to have a better sense of how large these effects are, or some other yardstick to help contextualize them.

(Remarks on code availability)

Reviewer #3

(Remarks to the Author)

The manuscript: “More educated people are more WEIRD: Higher education predicts global cultural similarity to WEIRD countries” addresses an important and timely question in the field of cross-cultural psychology: To what extent are highly educated individuals representative of the broader cultural diversity around the world? Drawing on data from the World Values Survey, the authors examine how education, income, and subjective social status relate to cultural similarity with WEIRD societies. Their central finding—that higher education is consistently associated with greater cultural similarity to WEIRD countries, while income and subjective status are not—is compelling and has significant implications for how researchers think about generalizability in cross-cultural work.

The paper is well-written, and the results are clearly presented. The large, diverse sample and the use of the cultural fixation index provide a strong foundation for the analyses. The finding that education predicts cultural similarity to the Anglosphere and Western Europe, but not to other globally influential countries such as China, Russia, or India, offers a valuable contribution to ongoing conversations about the global spread of cultural values and the role of educational systems in that process.

At the same time, there are several areas that would benefit from further development. The most pressing issue is the lack of a clear theoretical explanation for why education, specifically, appears to drive cultural convergence with WEIRD norms. The authors briefly mention the colonial origins of many education systems, but this explanation is underdeveloped and raises additional questions—particularly regarding countries without a history of European colonial rule. If education is indeed a vehicle for Western cultural transmission, we would expect variation depending on national histories and the structure of local educational systems. A more detailed discussion of these possibilities would strengthen the argument. The paper would also benefit from a more balanced treatment of the three SES indicators. While education is clearly the focus, the manuscript at times appears to assume in advance that income and subjective status will not matter. Since the pre-registration does not specify these expectations, the framing should be more explicitly exploratory, and the discussion should give more equal weight to all three variables.

Relatedly, the paper references prior work linking education to psychological outcomes, but it is not always clear which of these studies are U.S.-specific and which generalize more broadly. This matters a great deal when making claims about global trends. The authors may also want to revisit their use of the Miyamoto et al. (2018) study, which finds that education is associated with greater other-orientation in Japan—a finding that complicates the narrative that education uniformly aligns individuals with WEIRD values. Greater engagement with such counterexamples would improve the nuance of the interpretation.

There are also a few points of clarification needed. In the section comparing cultural distance to different subgroups within the U.S., the authors focus on high-education Americans but do not report whether high-education individuals in other countries are culturally similar to low-SES Americans. This comparison could help test whether the observed convergence is truly specific to high education and WEIRD cultural norms. Additionally, the section on specific value domains that show stronger versus weaker effects interrupts the broader country comparisons and would be clearer if reorganized.

Overall, this is a strong and thought-provoking paper. The data are impressive, and the core findings are important. With some additional attention to theory, a more even-handed discussion of SES dimensions, and minor adjustments to structure and clarity, the manuscript would make a valuable contribution to the literature.

(Remarks on code availability)

Version 1:

Reviewer comments:

Reviewer #1

(Remarks to the Author)

I think the authors have done an excellent job revising their manuscript. I read the revised version with interest and found it compelling and well-written. The only outstanding question I have, which could be addressed either in the Discussion section or some additional analyses (I'll defer to the authors), is whether "country" is a good unit of culture.

Of course, traditionally, many cultural psychologists have relied on the country as a unit of comparison, resulting in a large number of East-West -- and more recently WEIRD/non-WEIRD -- comparisons. It would be good to have a small discussion of this, or add additional within-country analyses. This has a long tradition in cultural psychology, but is only recently regaining attention. For example, Kitayama et al. (2006) argued that some of the within-Japan psychological differences could be attributed to historical processes. Talhelm et al. (2014) showed within-China differences in cognitive styles and cultural values, adding "Of course, two regions can never be 100% equivalent. There are differences such as climate and spoken dialect between north and south." Greenfield (2014) argued that sociodemographic differences within countries create variable cultural values. Recently, Atari, Henrich, and Schulz (2025) argued that "many 'cross-cultural' studies erroneously equated culture and country, implicitly ignoring within-country variations in psychological outcomes. This oversimplification, combined with the use of the word 'culture' as a noun, encourages essentialist thinking, implicitly suggesting that these are fixed entities."

This is indeed a minor suggestion. Again, I think this is an impressive study with much value for multiple fields. I look forward to seeing it in print soon.

References

Greenfield, P. M. (2014). Sociodemographic differences within countries produce variable cultural values. *Journal of Cross-Cultural Psychology*, 45(1), 37-41.
Kitayama, S., Ishii, K., Imada, T., Takemura, K., & Ramaswamy, J. (2006). Voluntary settlement and the spirit of independence: Evidence from Japan's northern frontier. *Journal of personality and social psychology*, 91(3), 369.
Atari, M., Henrich, J., & Schulz, J. (2025). The chronospatial revolution in psychology. *Nature Human Behaviour*, 1-9.
Talhelm, T., Zhang, X., Oishi, S., Shimin, C., Duan, D., Lan, X., & Kitayama, S. (2014). Large-scale psychological differences within China explained by rice versus wheat agriculture. *Science*, 344(6184), 603-608.

(Remarks on code availability)

Reviewer #2

(Remarks to the Author)

The authors have undertaken a thorough revision and among other things have addressed the one suggestion I had based on the original manuscript. I still believe that this paper makes important theoretical and methodological contributions and likely will be widely read and hopefully considered by those engaged in cross-cultural research going forward. Bottom line, I believe this paper is now ready for prime time so to speak.

-Michael E. W. Varnum

(Remarks on code availability)

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Reviewer #1:

1. **This is a beautifully written and carefully constructed paper with broad implications across multiple disciplines. The introduction does an excellent job setting the stage, and the analyses are rigorous and timely. I believe this work will be highly influential, particularly as scholars across psychology, political science, economics, sociology, and philosophy are increasingly engaging with the “WEIRD” problem. The use of a large, cross-national sample combined with a formal measure of cultural distance is a notable strength, and the findings raise important questions about who is typically represented in cross-cultural research. I offer the following comments in the spirit of constructive engagement. I hope the authors find them helpful as they continue to refine the manuscript.**

We thank the reviewer for their kind words about the strengths and value of our manuscript! It is very much our hope that these findings are useful to researchers across the human and social sciences.

Major Comments:

2. **Is the link to WEIRD tautological?**
Given that “Educated” is embedded in the WEIRD acronym, is there a risk that the central finding is tautological? While Henrich et al. (2010) were clear that WEIRDness refers to a psychological profile rather than just demographic descriptors, it would be useful for the authors to explicitly address this point. How does the effect of education compare with other dimensions of WEIRDness? This would help disentangle education from the broader (rhetorical) construct of WEIRD.

Indeed, we agree with the reviewer that although Henrich et al were clear that WEIRD was a heuristic rhetorical device, not a clearly defined theoretical construct, it is sometimes treated as the sum of the acronym. Nonetheless, our paper does to some degree address the other letters of the acronym, which are associated with wealth – we test both income and GDP per capita alongside other country-level characteristics. Related to this point, we now also compare subdimensions of the values and show that more highly educated individuals are more culturally similar across all dimensions (though only marginally significant for miscellaneous cultural traits).

We explicitly address the reviewers point in the general discussion:

“Such disparate effects also emphasize the importance of more nuanced theories of cultural diversity, wherein thinking about “WEIRD” cultures is a useful rhetorical tool but not one that should be taken literally to imply that being educated or rich are, on their own, meaningful indicators of cultural similarity.^{73,74} Our results highlight the value of considering the multiple personal, social, and geographic factors that shape culture

around the world, and the importance of disentangling various facets of WEIRD cultures. Although the notion of Western, Educated, Industrialized, Rich, and Democratic (WEIRD) cultures may be a useful heuristic for summarizing the unique features of the United States and other countries that diverge from Majority World nations, the idea of “WEIRD cultures” is merely a rhetorical device; empirical evidence is required to establish when and why cultures differ from one another.^{75,76} For example, the present findings indicate that education, but not being rich in income or social status, predicts cultural similarity to Western industrialized nations (such as Sweden, Australia, or the United Kingdom), but not necessarily similarities to rich industrialized countries in other parts of the world, demonstrating the potential for different aspects of WEIRDness to have divergent impacts on psychological variation.”

3. The role of political ideology

Related to my previous point, work by Talhelm (2018) suggests that political liberals across cultures may be more psychologically WEIRD. Could political ideology, rather than education per se, be driving some of the cultural convergence observed in the data? Clarifying this would strengthen the argument. If possible, including political orientation as a covariate or exploratory moderator could be informative.

Although political liberalism was not part of our primary preregistered analyses, this is an interesting idea that might explain why certain individuals show more WEIRD patterns of cultural values. As a preliminary test of this idea, we ran an exploratory analysis testing whether politically liberal non-Americans were more culturally similar to people in the United States than were politically conservative non-Americans. However, we did not find a consistent global pattern: Political conservatives were about as culturally distant from the United States (Mean CF_{ST} = 0.172 [0.157, 0.188]) as were political liberals (Mean CF_{ST} = 0.184 [0.168, 0.201]). In some countries, political conservatives were more culturally similar to Americans (e.g., Canadian conservatives), whereas in other countries liberals were more culturally similar to Americans (e.g., Brazil).

We are reluctant to include these results in the current manuscript, because the group-based nature of these CF_{ST} scores mean that we cannot easily include individual-level political orientation as a covariate or moderator, and a full treatment of how global political orientation predicts cultural values deserves a more full-throated treatment than we can give it in the current paper.

Instead, we now suggest political ideology as a useful avenue for future investigation in the Discussion: “Education may also expose people to liberal political ideologies that are more reflective of the dominant cultural norms of WEIRD nations.”⁷⁷

4. Accessibility of CF_{ST}

The use of the CF_{ST} is an innovative methodological contribution, but many readers outside of population genetics or cultural evolution may be unfamiliar with it. A brief, intuitive explanation—perhaps with a visual or mathematical summary—would make the measure more accessible to a broader social science audience.

Thanks, this is an excellent suggestion. We have provided a fuller description of CF_{ST} in the introduction, so that readers have a better conceptual understanding of this measure and how to interpret it so that they can better understand the results:

“We measured cultural distance using the cultural fixation index (CF_{ST}), which captures the degree of similarity between two different groups in their responses to the set of cultural traits captured by the WVS (see description by Muthukrishna and colleagues¹⁰ for further statistical information and validation). CF_{ST} reflects the difference between populations in the variance of the distribution of individuals’ responses to cultural value questions in the WVS. In population genetics, F_{ST} similarly reflects the difference in variance of the distribution of particular alleles at a particular locus of a genome, such as the variance in eye color between two populations. F_{ST} is theoretically meaningful within population genetics, and evolution more generally, because it measures how genotype frequencies for each subpopulation differ from expectations if there were random mating over the entire population; that is, it measures the degree to which the populations can be considered structured and separate (for example due to geography or mating preferences).^{61,62} Muthukrishna et al.¹⁰ argue that this is directly analogous to between-group differentiation caused by selection, migration, and selective social-learning mechanisms which structure how culture is transmitted. Thus, insofar as cultural evolution offers a compelling explanation for cultural transmission and change, CF_{ST} offers a theoretically informed approach to measuring cultural distance, with a long and established history within the broader biological and evolutionary sciences.

Importantly, CF_{ST} scores are able to measure differences not merely in a single cultural trait, but aggregated across the full set of different cultural value questions contained within the WVS, including traits that are independent from one another or are on different response scales (discrete and continuous). These cultural distance scores thereby index the overall magnitude of cultural differences between groups, across a range of many different cultural traits. Values of CF_{ST} can range from 0 (when the distribution of traits is identical between two populations) to 1 (when equal sized populations have completely different traits, and within-group traits are homogeneous with individuals sharing the same characteristics). Intermediate values indicate the magnitude of cultural differences accounted for by being part of different groups, with larger CF_{ST} scores indicating greater between-group differences in cultural trait distributions. Robustness tests showing that CF_{ST} values are not highly sensitive to the specific questions,¹⁰ and remain stable even when half the questions are selected at random, which is not surprising given the tendency for cultures to cluster⁶³ because of transmission mechanisms such as common sources of information and the conformist bias in cultural learning.^{64–66} ”

5. Consequences for the questions we ask

The authors highlight that over-reliance on highly educated samples may distort our picture of global psychological variation. Specifically, the authors mention, “One important implication of these results is that cross-cultural studies that primarily rely on university-educated populations over-represent cultural values that are typical of WEIRD countries; many highly educated samples from countries around the world are as culturally similar as other WEIRD countries.” I agree. I would

encourage them to push this idea further. If typical subject pools systematically over-represent WEIRD-aligned cultural values, does this shape the kinds of research questions and theories that become dominant? A brief reflection on how sample composition can influence the epistemic direction of a field would be valuable. In other words, “What would the field look like if our ‘typical’ samples were non-educated?”

Thanks - this is another important point that we very much agree with and appreciate the suggestion to further emphasize it. In the Discussion, we now explain that:

“An over-representation of highly educated participants may not only affect the results of psychological studies, but also the types of questions that are asked: The research questions and empirical methods used in psychological science are likely to over-represent the topics most valued and easy to reliably assess in WEIRD samples, while potentially neglecting other interesting dimensions psychological variation between non-WEIRD cultures. More inclusive research methods at all levels of scientific research, not merely in participant sampling, is necessary to create a truly universal understanding of human psychology (for additional examples and recommendation see ^{81–83}).”

6. Clarify the mechanism

The discussion of cultural transmission hints at essential processes, but the “how” remains somewhat underspecified. Are the authors envisioning social learning within educational settings, institutional selection effects, or something else? More explicitly articulating the proposed mechanism(s) would improve the paper’s power.

There are several plausible mechanisms through which education may transmit WEIRD cultural values, which we are investigating in related research. We have now revised the Discussion to include various potential mechanisms:

“What cultural transmission mechanisms are unique to education? One obvious pathway is through school curricula that is designed to transmit skills and knowledge (linguistic and mathematical abilities, analytic and problem-solving strategies, factual knowledge about the world), which might over-represent the skills and knowledge deemed important for success in WEIRD cultural environments. Additional cognitive characteristic of WEIRD psychology may be created by the structure of school environments, such as the directed instruction, delayed gratification, same-age classrooms, and modes of analytic thinking taught as the correct ways to navigate formal educational institutions, and which remain evident in schooled adults’ psychology across many areas of life. ¹⁹ In many countries, formal educational institutions may also have been directly created as part of colonial projects designed to pass the specific values and ways of thinking most prized by reigning elites onto the local populations, ^{20–23} potentially resulting in greater similarities between highly-educated individuals and the culture of former colonizers. Education may also expose people to liberal political ideologies that are more reflective of the dominant cultural norms of WEIRD nations.⁷⁷ In our analyses linguistic distance from the United States (a possible proxy measure for shared colonial history) did not predict or explain the education effect, but more direct

measures of colonial exposure may reveal clearer associations. For example, countries with a longer history of more direct colonial rule, or those whose education system more closely models Western institutions, might be the most likely to show cultural similarity to WEIRD nations among the highly-educated, whereas countries with less colonial history may have educational institutions that transmit less WEIRD knowledge, abilities, and values.

There may also be indirect channels. For example, individuals with more formal education may have more direct access to WEIRD cultural influences, through relevant English-language or computer-use skills that give them access to American media and industries that may transmit American cultural values. Highly educated, English-speaking individuals may also be more likely to get jobs in international corporations that involve engagement with Western business partners, thereby both exposing them to Western cultural values and reinforcing the perceived value of these Western norms.^{78,79} They may even have traveled to WEIRD countries to attend university, or been educated in schools run by teachers from WEIRD countries (e.g., religious institutions run by international missionaries). Each of these possibilities and others are important avenues for future research, that could not be tested using the present data.”

7. Minor Comments:

Please clarify how “values” are operationalized in the World Values Survey, particularly in relation to “moral values” and the literature on psychological WEIRDness (e.g., Atari et al., 2023).

We now clarify in the Introduction our use of the term “cultural values” in this paper:

“We use the generic term “cultural values” in this paper to refer to responses to all questions within the WVS that could plausibly be culturally transmitted. This includes traits such as participants’ reported moral, political, and religious beliefs, their attitudes towards other people and group memberships, and perspectives on child-rearing, sexuality, law, and economics, which together encompasses a broad range of different behaviors and preferences.”

We also return to this point in the Discussion, where we discuss the benefit of future researchers apply this type of cultural distance analysis to other types of cross-cultural data:

“We were also limited by our focus on self-reported beliefs and behaviors contained within the World Values Survey. Importantly, these questions cover a wide range of behaviors, attitudes, preferences, and beliefs across many domains of human experience, not merely a subset of moral values or other beliefs that might be of key interest to WEIRD researchers but might under-represent the true plurality of values across different cultures.⁷⁰ Previous research¹⁰ has provided evidence that cross-national variation in cultural distance (CF_{ST}) is correlated with cross-national variation in other psychological measures (both self-reported and behavioral), and thus indexes meaningful cultural

differences across many psychological domains.”

8. **In the first paragraph, where the authors discuss global psychological variation, consider referencing cognitive measures in addition to personality, motives, and values (e.g., Talhelm et al., 2014).**

Thanks, we have added a reference to psychological variation in cognitive styles, in addition to other aspects of psychology, in the opening paragraph: “For example, researchers have compiled many cross-national datasets to investigate cultural variation in personality³, social norms⁴, honesty⁵, values⁶, cognitive styles⁷, and fundamental social motives.⁸”

We have also added cognitive traits as a potentially interesting avenue for future research in the Discussion:

“Future research could also test for the robustness of this pattern across different datasets that measured other aspects of cultural values, beliefs, attitudes, cognitive styles, and behaviors.”

9. **On page 5, when discussing socioeconomic status (SES), parental education is notably absent. Given its importance in shaping psychological development (see Miyamoto et al., 2018), it may be worth including or at least noting.**

We have now mentioned parental SES as a relevant aspect of cultural variation in our introduction:

“Parental SES is also associated with the types of traits parents prioritize teaching to their children, such as independence, self-confidence, and uniqueness, in both the United States and in multinational investigations^{35,36}.”

10. **Figure 3 is difficult to interpret. Please consider enhancing the figure legend, adding more detail to each panel, or including a clearer narrative in the caption to help guide the reader.**

We have updated the figure legend and caption for Figure 3:

“For every country, mean cultural distance (CF_{ST}) between people living in that country and people living in other countries with high levels of education (red points), people living in other countries with mid levels of education (pink points), and people living in other countries with low levels of education (blue points). Each row depicts cultural distance between residents and non-residents of a different country, grouped by continent of the reference country. Countries are ordered by the size of the effect, ranging from (top) countries where highly educated non-residents are much closer in cultural values to residents of that country than less educated non-residents are to people of that country, e.g., Japan, to (bottom) countries where highly educated non-residents are much more

distant in cultural values and less educated non-residents are more culturally similar to people of that country, e.g., Indonesia.”

11. While the world is arguably becoming more educated, it is less clear whether it is becoming more psychologically WEIRD. A discussion of these two diverging (or converging) trends in the Discussion section could enrich the broader implications.

Yes, we suspect there are competing mechanisms here. For example, education may spread WEIRD values, but wealth may magnify existing cultural values. We’ve added this to the Discussion as the reviewer suggests:

“Alternatively, expanded access to education might not guarantee that the world as a whole embraces more WEIRD cultural traits, as other trends over time indicate greater divergences in cultural traits over past decades. For example, the increased endorsement of emancipative values in wealthy Western nations is not mirrored by similar increases in emancipative values as non-Western countries become wealthier, and indeed wealth may magnify or reinforce existing cultural values if they are associated with becoming wealthier or by investing in cultural traditions.⁶⁸ Education and income may also allow people to transmit and express other cultural traits that are valued in one’s local context, but not necessarily reflective of WEIRD norms (such as greater other-orientation being associated with higher SES in Confucian countries where interdependence is normative³⁰). While we anticipate the general trend of more WEIRD cultural traits among more educated than less educated people within a given nation will remain robust, expanded access to education does not necessarily imply that the world as a whole will become more psychologically WEIRD, as other cultural forces and competing mechanisms may generate psychological divergences between nations.”

12. On page 11, the statement, “The effect of income is consistent with some new findings arguing for a cultural amplifying effect of wealth [60],” is underdeveloped. Consider either elaborating on this claim or removing the sentence altogether.

We have rephrased this sentence to clarify the finding that we are referring to: “The effect of income may be consistent with some new findings arguing that wealthier countries are more likely to endorse distinctive cultural values that diverge from cultural norms elsewhere in the world ⁶⁸.”

13. Literature Cited

Atari, M., Haidt, J., Graham, J., Koleva, S., Stevens, S. T., & Dehghani, M. (2023). Morality beyond the WEIRD: How the nomological network of morality varies across cultures. *Journal of Personality and Social Psychology*, 125(5), 1157.
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socioeconomic status across cultures. *Journal of personality and social psychology*, 115(3), 427.

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We thank the reviewer again. These papers are now cited alongside the relevant edits.

Reviewer #1 (Remarks on code availability):

- 14. The code does not seem to be available. The linked OSF repo says "This folder is empty."**

We have double-checked and made sure that all data and code is available at the link provided in the manuscript:

https://osf.io/swq5j/?view_only=71abe8aa0b3e484085f874c5b866fffd

This OSF page includes separate components for the preregistration and for the data and code, with necessary files within the components.

Reviewer #2:

- 15. The authors report results from analyses of WVS data to test whether people who are more educated are more similar in their psychology to those living in WEIRD societies. The question is both of theoretical interest and one with important practical methodological implications for cross-cultural research, including the suggesting some caution in the interpretation of similarities across global samples. The authors find consistent evidence that people higher in education are more psychologically similar to the average psychology of WEIRD societies. These results appear to be robust, although I'll note I'm less familiar with the statistical approach used here. Interestingly the authors find that other markers of social class, like subjective status or income do not seem to have a similar relationship to cultural distance from WEIRD societies, an intriguing secondary finding. One that poses a bit of a puzzle perhaps, but that also helps pinpoint the role of education rather than other often confounded factors like income, in driving this pattern of results. In general I find the work to be compelling, likely to be of broad interest, and at least as far as I can tell methodologically and statistically sound. The paper is also well-written, the logic easy to follow, and it's well organized. Overall I like this a lot.**

We thank the reviewer for these kind comments. We have now added a paragraph explaining the CF_{ST} statistic.

- 16. Bottom line, I believe this manuscript could be published in its current form and meets the high bar for this journal. My only potential suggestion that might improve this piece, which the authors and editors can feel free to disregard, is that it would be useful to have some sense of standardized effect size for the key findings in order for the reader to have a better sense of how large these effects are, or some other yardstick to help contextualize them.**

Thank you for this excellent suggestion. CF_{ST} values are themselves the effect size, though interpretation of intermediate values can be non-intuitive because the effect size is non-linear (i.e. a value of 0.6 should not be interpreted as double 0.3). As such, we have instead compared values to Anglo nations that WEIRD readers may have an intuitive sense for cultural similarity (e.g., “For example, people in Singapore with low levels of education were quite culturally distant from the United States, $CF_{ST} = 0.241$, but highly educated people in Singapore were about as culturally similar to the United States, $CF_{ST} = 0.059$, as were highly-educated people in the Australia were to the United States, $CF_{ST} = 0.052$. Likewise, Russians with low levels of education were very culturally distant from the United States, $CF_{ST} = 0.358$, whereas highly educated Russians were about as similar to the United States, $CF_{ST} = 0.086$, as were highly educated people in New Zealand, $CF_{ST} = 0.081$.”). Figure 1 also includes the distribution of values and we include standardized coefficients to the regression results presented in the main text (although our primary models and tables report unstandardized coefficients as a more direct measure of the effect for CF_{ST} scores so readers have both presentations of the results).

Reviewer #3:

- 17. The manuscript: “More educated people are more WEIRD: Higher education predicts global cultural similarity to WEIRD countries” addresses an important and timely question in the field of cross-cultural psychology: To what extent are highly educated individuals representative of the broader cultural diversity around the world? Drawing on data from the World Values Survey, the authors examine how education, income, and subjective social status relate to cultural similarity with WEIRD societies. Their central finding—that higher education is consistently associated with greater cultural similarity to WEIRD countries, while income and subjective status are not—is compelling and has significant implications for how researchers think about generalizability in cross-cultural work.**

The paper is well-written, and the results are clearly presented. The large, diverse sample and the use of the cultural fixation index provide a strong foundation for the analyses. The finding that education predicts cultural similarity to the Anglosphere and Western Europe, but not to other globally influential countries such as China, Russia, or India, offers a valuable contribution to ongoing conversations about the global spread of cultural values and the role of educational systems in that process.

Thank you for these kind comments. We do hope that the paper does influence how researchers think about generalizability in cross-cultural work.

- 18. At the same time, there are several areas that would benefit from further development. The most pressing issue is the lack of a clear theoretical explanation for why education, specifically, appears to drive cultural convergence with WEIRD norms. The authors briefly mention the colonial origins of many education systems, but this explanation is underdeveloped and raises additional questions—particularly regarding countries without a history of European colonial rule. If education is indeed a vehicle for Western cultural transmission, we would expect variation depending on national histories and the structure of local educational systems. A more detailed discussion of these possibilities would strengthen the argument.**

This topic is an active area of research for us, but there are many possible pathways and mechanisms as the reviewer suggests. We have expanded our discussion to account for some of the main theoretical mechanisms we suspect may be responsible for the pattern of results we find for education:

“In many countries, formal educational institutions may also have been directly created as part of colonial projects designed to pass the specific values and ways of thinking most prized by reigning elites onto the local populations,^{20–23} potentially resulting in greater similarities between highly-educated individuals and the culture of former colonizers. Education may also expose people to liberal political ideologies that are more reflective of the dominant cultural norms of WEIRD nations.⁷⁷ In our analyses linguistic distance from the United States (a possible proxy measure for shared colonial history) did not predict or explain the education effect, but more direct measures of colonial exposure may reveal clearer associations. For example, countries with a longer history of more direct colonial rule, or those whose education system more closely models Western institutions, might be the most likely to show cultural similarity to WEIRD nations among the highly-educated, whereas countries with less colonial history may have educational institutions that transmit less WEIRD knowledge, abilities, and values.”

We also describe additional potential pathways (e.g., education provides linguistic and technological skills that provide access to WEIRD media and workplaces that act as additional agents of socialization), that may explain this effect even in countries without an extensive history of European colonial rule.

- 19. The paper would also benefit from a more balanced treatment of the three SES indicators. While education is clearly the focus, the manuscript at times appears to assume in advance that income and subjective status will not matter. Since the pre-registration does not specify these expectations, the framing should be more explicitly exploratory, and the discussion should give more equal weight to all three variables.**

We have gone through the paper to ensure that we are clear that we tested these three measures of SES but only found an effect for education. To ensure that reader don't think we are assuming in advance the effect of education, we now explicitly explain in the

introduction that: “As preregistered, we also tested whether higher income and subjective social status is associated with cultural distance from the United States, as we did not have a priori predictions that education would matter more than other facets of SES. But we focus our most comprehensive analyses below on differences based on education, as education showed the strongest association with cultural traits.”

20. Relatedly, the paper references prior work linking education to psychological outcomes, but it is not always clear which of these studies are U.S.-specific and which generalize more broadly. This matters a great deal when making claims about global trends. The authors may also want to revisit their use of the Miyamoto et al. (2018) study, which finds that education is associated with greater other-orientation in Japan—a finding that complicates the narrative that education uniformly aligns individuals with WEIRD values. Greater engagement with such counterexamples would improve the nuance of the interpretation.

We hope our revisions make it clear that we robustly show an effect of education, which we hope inspires follow up research to better understand the many possible mechanisms driving the effect. The majority of the prior work we are aware of in the literature on the relationship between education and psychological outcomes is either drawn from United States samples, or from multi-national surveys (such as the World Values Survey), with only a few examples, like Miyamoto et al., 2018, offering evidence of contradictory patterns.

Thank you for this feedback. We now indicated the sampled country when we refer to prior literature in the introduction, such as:

“For example, those with higher SES have been found, relative to low SES individuals living in the same country, to hold more independent views of themselves, to place less importance on interpersonal relationships and more importance on personal freedoms, and to display more analytic patterns of thinking. These patterns have been documented across several countries including the United States, Russia, China, as well as in multinational comparisons,^{27–32} although with potential evidence of inverse patterns of increased other-orientation among those with high SES in Confucian cultures such as Japan.³⁰ In longitudinal studies within the United States, change in national SES over time predicts subsequent increases in individualism.³³ And in cross-national studies, individuals with higher SES have lower power distance orientation and greater individualism, masculinity, and comfort with ambiguity.³⁴ Parental SES is also associated with the types of traits parents prioritize teaching to their children, such as independence, self-confidence, and uniqueness, in both the United States and in multinational investigations.^{35,36} Unfortunately, the socioeconomic background of participants in psychological studies is rarely reported (let alone meaningfully considered) in top-tier scientific publications.^{37”}

We return to Miyamoto et al. (2018) as a counterexample in the discussion, where we consider the possibility that education doesn’t necessarily lead to a convergence in WEIRD values in all contexts: “Education and income may also allow people to transmit and express other cultural traits that are valued in one’s local context, but not necessarily

reflective of WEIRD norms (such as greater other-orientation being associated with higher SES in Confucian countries where interdependence is normative³⁰).”

- 21. There are also a few points of clarification needed. In the section comparing cultural distance to different subgroups within the U.S., the authors focus on high-education Americans but do not report whether high-education individuals in other countries are culturally similar to low-SES Americans. This comparison could help test whether the observed convergence is truly specific to high education and WEIRD cultural norms.**

In Supplementary Table S4, we show the comparison between non-Americans and Americans of all education levels (high, medium, and low). We find that highly-educated non-Americans are more culturally similar to high-education Americans, $CF_{ST} = 0.139$ vs. 0.183 , and to mid-education Americans, $CF_{ST} = 0.17$ vs. 0.26 . However, there is no significant difference when low-SES Americans are used as the reference group, $CF_{ST} = 0.197$ vs. 0.201 , although we recommend interpreting this latter comparison with caution due to the number of low-education Americans ($n = 98$) being below our preregistered cutoff for reliable CF_{ST} scores. Since other readers may have this same question, we have included this result with the appropriate caveat in the main text:

“Patterns of results were qualitatively the same when only considering the cultural distance to those with high education in the United States, or to those with mid education in the United States, rather than the whole American sample (although there was no significant difference when comparing non-Americans to Americans with low levels of education, but this comparison should be interpreted with caution due to this sample size falling slightly below our pre-registered cutoff of $n = 100$ per group for analysis). Income or status again did not predict significant cultural differences (see SI Table S4 for full results).”

- 22. Additionally, the section on specific value domains that show stronger versus weaker effects interrupts the broader country comparisons and would be clearer if reorganized.**

Thank you. We have re-arranged the order of presentation in the main text, to present the findings across specific value domains after discussing all broader country comparisons.

- 23. Overall, this is a strong and thought-provoking paper. The data are impressive, and the core findings are important. With some additional attention to theory, a more even-handed discussion of SES dimensions, and minor adjustments to structure and clarity, the manuscript would make a valuable contribution to the literature.**

We really appreciate this thoughtful feedback. The manuscript is stronger, clearer and hopefully more thought-provoking and impactful due to the resulting revisions. Many thanks.

Reviewer #1 (Remarks to the Author):

I think the authors have done an excellent job revising their manuscript. I read the revised version with interest and found it compelling and well-written. The only outstanding question I have, which could be addressed either in the Discussion section or some additional analyses (I'll defer to the authors), is whether "country" is a good unit of culture.

Of course, traditionally, many cultural psychologists have relied on the country as a unit of comparison, resulting in a large number of East-West -- and more recently WEIRD/non-WEIRD -- comparisons. It would be good to have a small discussion of this, or add additional within-country analyses. This has a long tradition in cultural psychology, but is only recently regaining attention. For example, Kitayama et al. (2006) argued that some of the within-Japan psychological differences could be attributed to historical processes. Talhelm et al. (2014) showed within-China differences in cognitive styles and cultural values, adding "Of course, two regions can never be 100% equivalent. There are differences such as climate and spoken dialect between north and south." Greenfield (2014) argued that sociodemographic differences within countries create variable cultural values. Recently, Atari, Henrich, and Schulz (2025) argued that "many 'cross-cultural' studies erroneously equated culture and country, implicitly ignoring within-country variations in psychological outcomes. This oversimplification, combined with the use of the word 'culture' as a noun, encourages essentialist thinking, implicitly suggesting that these are fixed entities."

This is indeed a minor suggestion. Again, I think this is an impressive study with much value for multiple fields. I look forward to seeing it in print soon.

References

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Atari, M., Henrich, J., & Schulz, J. (2025). The chronospatial revolution in psychology. *Nature Human Behaviour*, 1-9.
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We agree that country is only one possible way to assess cultural differences, and that country may not be the most relevant unit of culture for every research question. We do find in the present datasets that the magnitude of CF_{ST} *between* countries is often larger than CF_{ST} between other demographic groups within each country, indicating that country is capturing something meaningful about cultural groups. However, additional variation is likely accounted for by other factors that lead to systematic variation within each country.

We now highlight this in the Discussion:

“The present findings also suggest that researchers should be cautious in using “country” as a proxy for cultural groups, when trying to understand diversity in psychological processes around the world.⁷⁷ Research using the CF_{ST} measure indicates that differences between countries are often larger in magnitude than differences between sociodemographic groups within each country^{67,78}, but there is also additional variance within countries that can be understood by looking to someone’s socioeconomic status, economic and ecological conditions, religion, or ethnicity (e.g.,^{25,79,80}). Researchers therefore cannot assume that merely recruiting participants from different countries is always the most meaningful way to assess cross-cultural variability in psychological studies.”

We have chosen to leave further analyses of within-country analyses across other demographic characteristics (e.g., geographic region, ethnicity, or religion) for a future publication, to give them the full treatment they deserve.

Reviewer #2 (Remarks to the Author):

The authors have undertaken a thorough revision and among other things have addressed the one suggestion I had based on the original manuscript. I still believe that this paper makes important theoretical and methodological contributions and likely will be widely read and hopefully considered by those engaged in cross-cultural research going forward. Bottom line, I believe this paper is now ready for prime time so to speak.

-Michael E. W. Varnum

Thank you for your support of our paper!