Dear Editor,

Please find the revised edition of originally submitted manuscript titled “Motor differences in individuals with autistic traits”.

We thank the reviewers for their constructive comments. Below we provide detailed responses to each of the reviewers’ points.

Reviewer 1

1. Change title: “Motor differences in individuals with autistic traits” is way to vast, because there is one single test used in the study. ‘Differences in finger tapping tests results are correlated with the autistic disorders scale and age in non-diagnosed populations with autistic traits. An online, self assessment study.
   Response: We have amended the title to “Differences in finger tapping in adult individuals with autistic traits: An online study”
2. State in the introduction that the test was online
   Response: this is included on line 115
3. Add that the participants were not diagnosed with having autistic disorders in the introduction
   Response: This is included in the Abstract, and also included on line 115
4. No raw data shared
   Response: The data were included with submission. We are unsure why this Reviewer was unable to access this for their review. We have reviewed our submission and confirmed the data is there and is accessible in the PeerJ requested format. Alternatively, the data can be accessed via https://github.com/deborah-apthorp/FTT_Autism_Reproducible_Results as mentioned on line 375.
5. Aims and hypotheses do not fulfill title of paper
   Response: The title has been amended, so that the aims and hypotheses are now more clearly aligned.
6. Methodology section need more details and information to replicate –
   Response: We are not sure what additional details are required here. All test images and instructions have been included in the Supplementary materials. We have now also added, in the Supplementary Materials, the Inquisit script that we used to run the experiment, which is also freely available at the Millisecond website: https://www.millisecond.com/download/library/fingertapping, as well as on our public OSF repository: https://osf.io/mqyg9/. We feel this should make the research fully reproducible.
7. Limitation: I strongly recommend to include in the title and aims the element of online testing and online self assessment – “F.e. the technique of the FTT – one can do the test with the wrist on the laptop case, some with the wrist on the table using separate keyboard, some with the wrist in the air. What is more the type and construction of the keyboard could possibly affect the results, one possibly could use the same hand for dominant and non-dominant test, and finally – the situation where somebody uses two hands or more fingers to do the test neither can be declined.” -
   Response: This is now addressed on lines 365-370: “Furthermore, in the use of online research like this, we ran the risk of individuals not following the instructions fully; for instance, someone not using the correct finger, or using more than one finger; and there was no way for us to police this practice. Although we only had one

Commented [NC1]: This makes it sound like you looked at high vs low trait groups, rather than looking at autistic traits as a continuous variable. Also, ALL people arguably have autistic traits.

Perhaps: “Autistic traits are associated with individual differences in finger tapping: An online study.”

A general note about language. I would like to strongly encourage the authors to consider revising the language used to describe autism in their manuscript. In particular, I would like to suggest using “autism” instead of “ASD” and “autistic people” or “people with autistic traits” vs “people with ASD/ASD traits”

Although there is variability amongst people as to the preferred language used to describe autism, there is growing empirical data suggesting that identify first (vs person first) language is mostly preferred and seen as less stigmatising. Further, labels such as ASD (although official diagnostic labels) should be avoided since they describe autism – which is seen by many as being central to their identity – in a negative/stigmatising way.

See:

1. https://pubmed.ncbi.nlm.nih.gov/26134030/
2. https://onlinelibrary.wiley.com/doi/full/10.1002/aur.2864
3. https://journals.sagepub.com/doi/full/10.1177/13623613221142383?casa_token=8MoAxOO5fVUAAAAA%3A4O-TakfBknjaEM2oAktkHmOOKQCxuGPxsAyiqxkrcqcKDgesM78gE6n4sChJuXE8vkiOJ_W-Msjl2Q

outlier in this study, we acknowledge that the data were not collected under controlled conditions. However, this would likely have added noise to the data rather than biasing it systematically."

8. AQ-10 – "If the authors find a paper comparing the online AQ-10 results with face to face self assessment or assessment by a third person it may be considered to cite in the work to show the possible differences coming from the different conditions of the assessment."

   Response: We found this citation: Cheung, T. C., Reza, T. B., Pereira, C. F., Mukhi, S., & Niemeier, M. (2023). Limited Reliability and Validity of the Autism Spectrum Quotient Short form (AQ-10) to Screen Autistic Traits in Undergraduate Students. *Journal of Autism and Developmental Disorders*, 1-2.
   However, while this research does test online and then in-person, it tests with young university students only, using the longer version, then pulls out the AQ-10. So, it isn't really quite what we are looking for – if the reviewer has a more appropriate citation, we would appreciate their recommendation. Note that have not yet added this citation.

   Commented [NC2]: I think this is still relevant in raising and addressing R1's point, so I would suggest to reference this in the manuscript.

9. I suggest considering putting the data about the software used to an appendix at the end of the paper.

   Response: We have not adopted this suggestion, since we feel strongly that academic software should be cited and recognised in the literature.

10. Reducing conclusion and adding a practical application section "There is no link between the FTT and every day life fine motor skills and actions characterized in the introduction. If the Authors would do so, at the end of the paper in the practical application section there can be put very useful instructions for the practitioners."

    Response: Thank you for this helpful suggestion. In the Introduction, we have now added the following sentence: "This test is thought to be an index of psychomotor speed, which is reflected in everyday tasks such as writing, typing, cooking and speech." (Lines 63-64.) In terms of practical applications, a suggestion has been added to the Discussion: "a practitioner could, based on an individual's finger tapping result in combination with clinical observations, recommend targeted therapy or medication for the individual if they appear to show psychomotor impairment." (Lines 398-400)

    Commented [NC3]: I think this implication is possibly reaching too far, especially since these data come from a non-clinical sample. It is also not clear how this would inform a 'targeted' behavioural/medicinal intervention. It feels more reasonable to say that this can be useful in screening and prompting further clinical interrogation.

Reviewer 2

1. Line 109: authors stated that "To date there has only been one study published that explores the relationship between motor impairment and autistic traits in the general population". However, no citation is provided.

   Response: thanks for pointing out this omission. We have now included the citation: Cassidy, S., Hannant, P., Tavassoli, T., Allison, C., Smith, P., & Baron-Cohen, S. (2016). Dyspraxia and autistic traits in adults with and without autism spectrum conditions. *Molecular Autism*, *7*, 48. https://doi.org/10.1186/s13229-016-0112-x

2. All statistical notations should be in italics. For example, in Table 1 (p, SD)

   Response: This has been changed in both text and in tables

3. Line 307: The idea proposed by Lever and Geurts (2016) sounds interesting. It is better if the author briefly elaborates on the theories.

Response: This is an interesting suggestion, but we feel that too much elaboration would detract from the flow of the paper, as we explain in the next few sentences how the theory could be applied to this study.

4. Line 347 and 348: Can specifically mention other reliable measures of autistic traits.

Response: We have added this reference to a newly validated measure (cited on line 385): English, M. C. W., Gignac, G. E., Visser, T. A. W., Whitehouse, A. J. O., Enns, J. T., & Maybery, M. T. (2021). The Comprehensive Autistic Trait Inventory (CATI): Development and validation of a new measure of autistic traits in the general population. *Molecular Autism*, *12*(1), 37. https://doi.org/10.1186/s13229-021-00445-7 - please note that this measure was not available at the time the study was conducted in 2018.

5. Line 352: it should be the general population.

Response: This has been amended.

6. No measure of handedness

Response: This is correct – we did not measure handedness, and this is a limitation of the study. As the study was part of a larger project, we were limited in the number of assessments we could include without creating an unreasonable runtime and still have a reliable assessment.

7. No mention of how split the data was on AQ-10 - the exact number of High and Low ASD traits is not explicitly stated.

Response: As we were not focusing on treating our data as split groups, but rather treating autistic traits as a continuous variable, splitting and presenting it in such a way would not be appropriate for this research, and would result in a reduction in power. Since the data are openly available, interested researchers could check for themselves.

8. The Analysis and Results section did not answer and is not parallel to the research hypothesis - the author mentioned that they predict and want to compare high and Low ASD traits on motor functioning. And also the effect of age and gender. It would be good if the author could add the comparison analysis of Low and High ASD traits on motor functions.

Response: We believe that the wording of the hypothesis and the presentation of both correlation table and regressions analysis are appropriate way of interpreting and presenting these hypotheses. We do not present "high" and "low", which would denote a group comparison. We would like to direct the Reviewer's attention to Figure 2 for this visual comparison of all three variables.

9. A descriptive table showing the age distribution of the participants can be added since age is an important variable in this study.

Response: Table 1 provides descriptive of all key variables including age. Information in the Participants section gives the age range of 18-78. We are unsure whether the reviewer requires any additional information, such as histograms, but this is not typical for published papers in this field.

10. FTT insufficient single measure to measure motor functioning. Could you justify why you rely on this one measure and elaborate further on why you chose (FTT)?

Response: This is covered in lines 40 – 52. "Neuropsychological measures can provide more consistent and less biased reporting on behavioural output in addition they can be mapped onto known areas of the brain and provide vital information of

Commented [NC4]: I think this is a good suggestion and that 1-2 more sentences providing some more detail of this account would be useful. In particular, I would like to know whether L&G's account refers to specific cognitive domains – and is there any empirical support for this framework with specific reference to motor cognition?

Commented [NC5]: I didn't see this mentioned in the limitations section. This does feel like a significant limitation, especially given that very brief measures of handedness exist. So I think this should be mentioned.

neurological and structural underpinnings of ASD. Finger tapping and is one such task that we believe has the validity and capability providing reliable data in an online experiment"

11. The difference in motor functions in high and low individuals with ASD traits from the general population is not sufficiently analysed and discussed in the report.
    Response: See our response to Point 7.
12. Method section (procedure) should include more details.
    Response: See our response to Reviewer 1 point 6.

Commented [NC6]: This does not match what is in the manuscript. I actually think what is currently in the manuscript is fine – just be careful when citing changes or text in ms here to ensure it reflects your current manuscript version.

Commented [NC7]: I agree with both reviewers, that the procedure section is limited.

Links to the test scripts should be directly referenced in this section, as well as included in supplementary materials. Note that you do not reference the **script** as being in the Supp materials, in text, only the instructions/screenshots.

The procedure also notes other tests/measures that were administered (e.g., DASS21) but only names the acronym without saying what the test was, or providing a citation. Even though these data were not analysed in this study, they were part of this study and it is important to contextualise how data was collected.

Even though the FTT is very simple, I think a small schematic outlining the procedure would be helpful for so many readers – including any depictions of what participants saw on the screen. I think it would be great if these were not buried in supp materials.

Reviewer 3

1. No reliability analysis reported for AQ-10
   Response: Perhaps the reviewer missed this in their review of our article, as it is reported on line 160 in the Materials section under the AQ-10.
2. Cite Taylor, Emily C., Lucy A. Livingston, Rachel A. Clutterbuck, Punit Shah, and Christine Payne. "Psychometric concerns with the 10-item Autism-Spectrum Quotient (AQ10) as a measure of trait autism in the general population." Experimental Results 1 (2020). Paper
   Response: This paper was mentioned in the article when discussing limitations, but was not originally cited in the paper proper. This has been amended and the full citation is now included (see Line 383)
3. Variable of 'Gender' being excluded from certain analysis. This variable is discarded from the main analysis using Johnson-Neyman's simple slopes and also from the analyses shown in Tables 3 and 4, where its interaction with AQ10 score is not explored as was done for Age. Notice that there is a significant difference in the finger tapping task (FTT) performance for Gender. Thus, it could have a significant influence on the results plotted in Fig. 2 where the relationship between FTT rate and AQ10 score is studied in more detail while only controlling by Age.
   In general, instead of Johnson-Neyman interval analysis, I would suggest using "linear regression with interaction effects" analysis, which can explore Gender together with Age and all the possible quadratic interactions.
   An alternative would be to substitute the analysis in Tables 3 and 4 with the suggested more general "interaction effects" analysis (including all possible quadratic interactions), and in the case that only Age's interactions are significant, then proceed with the Johnson-Neyman analysis. –
   Response: There was no significant interaction between gender and AQ traits for this sample, and since we did not hypothesise this in our preregistered analysis, it was not included in the main analysis. We did indeed carry out a multiple linear regression analysis with interactions, including the main effect of Gender, and the Simple Slopes analysis is only used as a follow-up of the significant interaction between Age and Autistic traits. We do not understand the comment about quadratic interactions, since this was a regression analysis, not an ANOVA. Again, since our hypotheses and analyses were preregistered, we did not consider it appropriate to include additional exploratory analyses. We have now added the exploratory analysis including the non-significant interaction between Gender and AQ-10 score to the Supplementary Materials. The main effects of age, gender and AQ-10 score and the age*AQ interaction are unchanged in these analyses.