Author's response to reviews

Title: The developmental relationship between language and motor performance from 3 to 5 years of age: A prospective longitudinal population study

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Author's response to reviews:

Dear editor,

We are grateful for the opportunity to correct and improve the manuscript once again. We thank the reviewer for helpful suggestions. We believe that the manuscript has been further improved with the changes done based on her remarks.

All changes are marked in red throughout the text. Following is a point-by-point response to the comments provided by the reviewer.

Thank you for accepting the manuscript.

Best regards,

Mari Vaage Wang
Corresponding author

Reviewer's report:

1. The references to age are now consistent and make sense.
Response: We agree that this is now clearer and thank the reviewer for the suggested corrections.

2. There are still numerous difficulties with English and some further verb agreement errors. I believe I suggested proof reading by a native English speaker and I don't know if this has been done but if so, perhaps someone with a closer specialism to the paper would help matters as some of the difficulties are in over-colloquial or inaccurate use of language. I would have hoped that I did not have to proof-read this paper once again.
Response: Thank you for pointing this out again, and for correcting even more of these errors. The paper was proof read by a native English speaker after suggestion from the reviewer in the last revision and all suggestions from the reviewer have been followed. Hopefully the errors are now corrected.
Introduction

3. The authors state that they have changed their hypotheses in line with their findings. Surely the whole point of a scientific paper is that hypotheses are made and then are supported OR not supported? Can the authors not make hypotheses and then discuss their findings in light of their hypotheses? I am not sure this is in the spirit of science.

Response: The statement was unfortunate, and we are thankful for the opportunity to clarify this. The hypotheses have not been changed. However, they were rewritten in a hopefully clearer and more precise manner. Also hypotheses were added to include gender and a division between gross and fine motor skills, as requested by the reviewer. To underline that no changes in assumptions were made and that the changes were merely clarifications the changes done from the original manuscript to the final revision are repeated in the following.

In the original paper we presented the following hypotheses:

“More specifically we hypothesise that; there are cross-sectional correlations, performance at three years of age predicts performance at five years of age within and between domains, and that there is gender differences.”

This was clarified on request from the reviewer. The reviewer suggested spelling out the hypotheses, and they were changed to include more detail, especially on gender, and also including the division between gross and fine motor skills:

“More specifically we hypothesise; there are cross-sectional correlations – language and motor performance are associated at both 3 and 5 years of age; performance at three years of age predicts performance at five years of age both within and across domains – change in language performance predicts change in motor performance, and change in motor performance predicts change in language performance; there are gender differences – boys have poorer skills in both language and motor domains, and we explore whether there are gender differences also in associations within and across domains over time. Finally, we hypothesize that associations are similar for both gross and fine motor performance. We also investigate the specificity of each developmental domain.”

In the latest revision the following hypotheses were presented. They are still the same, but are now spelled out even more precisely:

“More specifically we hypothesise; there are cross-sectional correlations – language and motor performance are associated at both 3 and 5 years of age; language and motor performance are both stable from 3 to 5 years of age, language performance at 3 years of age predicts change in motor performance from 3 to 5 years of age, and in motor performance at 3 years of age predicts change in language performance from 3 to 5 years of age; there are gender differences – boys have poorer skills in both language and motor domains, and we explore whether there are gender differences also in associations within and across domains over time. Finally, we hypothesize that associations are similar for both gross and fine motor performance. We also investigate the specificity of each developmental domain.”
We found a misspelling in the sentence: "..., and in motor performance at 3 years of age predicts...". This was corrected and the word “in” was removed from the sentence. Otherwise the content and assumptions of the hypotheses have not been changed.

4. The authors removed the rather basic discussion of language development and also state that they don’t feel their study is of value in addressing theories of motor-language links. This study could potentially be of immense value in this area and I think they are selling themselves short by excluding this.

Response: We are grateful for the reviewer’s perspective on the value of the paper. We have added the following section to the introduction: “The development of gestures is the foremost example of this. Motor skills influence the performance of gestures and studies have shown that children with language delays very often have a history of problems with gestures [5, 6]. Further, theories of motor cognition, i.e. the notion that cognition is embedded in actions, suggest that perception and action share common computational codes and underlying neural architectures. This idea has been further developed in the study of mirror-neurons. It has been suggested that the mirror-neuron system is the basic neural mechanism from which language has developed, and that this system represents a strong link between language and action representation [7]. Theories of embodied cognition argue that motor resonance enhances language comprehension [8, 9]. These theories suggest that a broader developmental focus should be employed both in research and in clinical practice when investigating language and motor development.”

Results
5. A general point about the reporting of results – several P values are reported as "= .000". I assume they mean "< .001"?

Response: The reporting of P values has been changed in accordance with the suggestions from the reviewer.

Discussion
6. Again some vague and unclear language. One point that might merit additional examination is the point on page 17 about a “true developmental relationship”. It is possible that a "true" relationship might be the same in typically developing versus clinical samples – but it might not be the same. In other words, there may be no one "true" relationships. The final paragraph and in particular the final sentence is particularly unclear; paragraph 2 on page 18 could also use some clarity.

Response:

The reviewer makes a good point. We agree that the word “true” is unclear. The two last sentences in the first paragraph on page 17 have been changed to: “Furthermore, if there is in fact an association between these domains, children seen by specialists are already at risk of cognitive problems because of their motor problems or vice versa [47]. Thus, population based samples are needed
in order to identify developmental relationships between these domains not limited to the extreme ends of poor performance.”

Specific comments

Pg 3 paragraph 2 second sentence: "less clear distinction between groups" – less than what? Which particular groups are referred to here – the opening sentence does not specify which disorders. Further down this paragraph "what each specific disorder could account for" is rather unclear and odd phrasing too.

Response: We are glad to sort out any misunderstandings and unclear formulations. We certainly see that these are some of the. The two first sentences on pg 3 para 2 was changed to “Lately, researchers have questioned the specificity of several developmental disorders [5, 6]. The frequent overlap in symptoms across domains in developmental disorders as well as co-morbid diagnoses suggests less clear distinction between clinical groups, especially in children, than suggested by the diagnostic systems.” The sentence further down the paragraph was also changed. It now says: “…measures of developmental difficulties additional to those corresponding to their diagnosis compared to those with low standard scores.”

Pg 4 – "genetic traits" – this is very non-specific.

Response: We have added more information to make this more specific: “…and children with DCD have been found to have neurological similarities to children with SLI, such as frequent rolandic spikes during sleep, suggesting a genetic component.”

"developing late" is very colloquial – I suggest "developmental delay".

Response: The sentence has been changed as suggested by the reviewer.

Paragraph 2 – "conclusion of literature" - very poor wording.

Response: The sentence is corrected and now says: “finding of literature”.

Pg 5 – sentence beginning "Few longitudinal studies…” - references to these studies would be helpful here.

Response: The last part of the paragraph has been changed to better illustrate the two longitudinal studies that suggest that half of children with difficulties catch up: “Few longitudinal studies have investigated developmental stability of language and motor skills in general populations and results from these are inconsistent. However, the prospective longitudinal study Early Language in Victoria Study (ELVS) [24] showed that about half of late talkers catch up with their peers, and a Finnish follow up study [25] suggested that about half of children with motor delay also catch up with their peers.”

Paragraph 2 on this page seems to repeat information from earlier in the Introduction.

Response: The information is to some degree repeated but it is also extended. We are not sure what exactly the reviewer wish to change and thus no changes has been made in this section.
Alcock & Krawczyk didn't find an association between gross motor abilities and language abilities. 

Response: We apologize for the misunderstanding. In table 8 in the paper by Alcock & Krawczyk (results of regression analyses examining the influence of motor abilities on language measures, controlling for cognitive abilities and socio-economic status: Other group) the relationship between gross motor skills and language production is significant, but we understand that the effect was not found when oral motor control was included in the analyses. We agree that it is misleading to report this as was done in the last revision of the manuscript, and the sentence has now been changed to the following: “Further, one study on 21 month old children [4], investigated various motor skills, including oral movements, in association with language production, comprehension, and complexity. Results showed no residual associations between gross and fine motor performance and measured aspects of language development when controlling for oral motor movements.”

Page 10 – combine the two middle paragraphs to avoid single sentence paragraphs.

Response: This has been changed.

Page 13, bottom – "a significant increase" – over what?; likewise "variance specific to language decreased" needs clarification.

Response: We agree that this was unclear and the “…a significant increase over time…” and “…from 3 to 5 years of age.” were added to the two sentences.

Pg 14 – Gender differences "Girls performed better" – significantly better?

Response: The appendix presents the distribution of scores across response categories, and the percentage of mothers answering confirmative on good performance on the presented tasks is higher for girls than for boys on all variables. The difference was not significance tested. The following clarification was added to the text: “These differences were not significance tested. However, to further investigate.”

Pg 15 – para 2 - "stability within DOMAINS is" "language at 3 years of age WAS" Later in the same sentence – the correlation – which correlation?

Response: This was corrected, and the correlation is now referred to as “...the correlation between domains.”

Next sentence – "something specific" – what exactly? This is very vague! Later in the same sentence – "indicative of fine and gross motor..." – of what? Poor? Good? Variable performance?

Response: We agree that this is unclear and vague. Since it was meant as a clarification of the preceding sentence it has no purpose when not being clear. It was therefore deleted.

Pg 16 paragraph 2 – "In motor development..." – bracket "however" with
commas, don't use "like", no comma before "occur" Pg 17 – para 2 – were all parents reporting female? If not use "parent" not "mother".

Response: Commas were inserted and removed where suggested, and “like” was changed to “such as”. All parents reporting were mothers.

Table 3 – each row has asterisks indicating significance next to each mean (confidence interval) PLUS a significance indicator on the RHS. It is not clear what the difference between these is.

Response: The asterisks after confidence intervals indicate whether the parameter for each gender is significant, whereas the column on the right hand side indicate whether the gender difference is significant (comparing confidence intervals). I have added “gender difference” as a heading over the column indicating whether the gender differences are significant.