

## Response to Reviewers' Comments

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**Title:** Culturally adapted pictorial screening tool for autism spectrum disorder: a new approach

**Authors List:** Hemamali Perera, Kamal Chandima Jeewandara, Sudarshi Seneviratne and Chandima Guruge

### Responses are given in red

#### Reviewer 3

This study investigated PAAS for the screening of ASD. The ASD scoring system is potential useful. Table 1 was easy to understand PAAS.

1. The authors stated that M-CHAT is not reliable for culturally varied populations. This point should be clearly presented in Introduction.

We have not made an inclusive statement that “M-CHAT is not reliable for culturally varied populations”. To explain this, extracts from our paper is given below.

In “Introduction” (paragraph 2), we stated that in general, “almost all screening and diagnostic instruments available are not designed to consider cultural and ethnic variables, or influences in using those. Hence, their use in culturally diverse populations has been a challenge, with a risk in adversely affecting the true estimates in epidemiological studies (Varma 2014, Bernier 2010)”.

More specifically (in paragraph 4), we stated that “M-CHAT has been translated to several languages. Some have shown satisfactory reliability when used in such culturally varied populations, while some did not”. Here, we gave 8 references in support of our statement (Mohamed 2016, Samadi 2016, Seung 2015, Beuker 2014, Kimple 2014, Vong 2004, Russell 2010, Yousefi 2015). To explain further, we chose 2 examples, one negative and one positive outcome, which was stated as “in a large community survey, an Arabic validation of M-CHAT failed to identify a substantial proportion of children, 18-24 months of age suspected to have ASD (Mohamed 2016). However, a Chinese version showed a good sensitivity (Wong 2004)”.

A modification is made to the last 2 sentences, which now read as: “For example, in a large community survey, an Arabic validation of M-CHAT failed to identify a substantial proportion of children, 18-24 months of age suspected to have ASD (Mohamed 2016). However, a Chinese version showed sensitivity as high as 93% on a similar age group (Wong 2004).

We did not consider that describing all 8 studies was necessary.

2. PAAS seemed a good method. But the superior point of PAAS to M-CHAT was not clear.

The purpose of this study was to investigate the sensitivity and specificity of a new screening tool. We did not aim at any point to show superiority of PAAS over M-CHAT as this was not considered possible, relevant or useful. The reasons for embarking on developing a culturally adapted screening tool for ASD is given in the last paragraph of Introduction, which reads as:

“Justification for development of such a tool came from two previous research outcomes. First was in using a translated M-CHAT in a total population screening at 18-24 months of age (Perera 2009). The study found that sensitivity of M-CHAT was only 25%. Second was a study on the presenting complaints in a clinical cohort of children later diagnosed with ASD. Abnormal play behavior and social un-connectedness were presented as key problems in only 1.2%, which was in marked contrast to 82.3% seeking help for delayed speech development (Perera 2013). Possible reasons for both findings were considered as socio-cultural influence where parents attributed less importance or failed to notice deficits in social behavior. The alternative was to develop a tool that may reduce these cultural barriers to screening”.

Hence, our conclusion was simply that “PAAS is an effective tool for screening ASD” for the population for which it was used.

Therefore, no changes were made in this regard in the revised manuscript.

3. This manuscript did not show how to score and evaluate based on PAAS.

Scoring and evaluation in PAAS is described further in the revised manuscript and will now read as follows.

“The written items and the matching photographs (facing each other on the opposing pages) were compiled into a manual. The end product was a list of 21 items where 20 items carried photographs to match. The last item was in text only (item 21) as it was difficult to convey meaning in a photograph. The self-assessment responses by parents were recorded on a separate sheet giving the numbered items in text with a choice of “yes” or “no” as the response. A “Yes” response to items 15, 16 and 21, and a “No” response to all other items was taken as positive indicators for ASD. Four or more positive indicators according the above scoring were taken as positive for ASD. Appropriate response to each item in support of ASD was counted as one”.

Accordingly, the items are now numbered in Table 1.

4. Were the PAAS results a summation of Yes” of question of PAAS?

This issue is clarified above in 3 and given in the revised manuscript - A “Yes” response to items 15, 16 and 21, and a “No” response to all other items was taken as positive indication for ASD.

5. How was the scoring system?

This issue is clarified above in 3 and given in the revised manuscript - The self-assessment responses by parents were recorded on a separate sheet giving the numbered items in text with a choice of “yes” or “no” as the response.

Any other scoring system such as a Likert scale was not used. The aim was to keep the scoring as simple as possible and model M-CHAT at the same time.

6. How were the sample children determined ASD or not?

This issue is clarified above in 3 and given in the revised manuscript - “Four or more positive indicators according the above scoring were taken as positive for ASD. Appropriate response to each item in support of ASD was counted as one”.

7. In discussion, it would be appropriate to compare M-CHAT and PAAS.

Comparison between M-CHAT and PAAS is already given in the Discussion in paragraph 2 – “Our results showed that PAAS performed well in identifying ASD. This was evident from a sensitivity of 88.8% in discriminating between ASD and non-ASD developmental disorder, and 88.0% between ASD and typical development. In comparison, in the previous community based study, the respective results for M-CHAT were sensitivity of 25%, specificity of 71%, PPV of 0.13 and NPV of 0.85<sup>[27]</sup>”.

Also, the 2 scales get compared in the last paragraph in the Discussion - “Using an arbitrary rather than a calculated cut-off score of 4 positive items is a limitation in our study. However, in M-CHAT, positive response for only 2 critical items or 3 of the others is taken as positive for ASD. Similarly, in keeping with M-CHAT and other similar screening tools, “Yes / No” responses were implemented rather than a Likert scale”.

Bringing these 2 sections together is not possible as the former is highlighting the essence of this study and the latter is discussing the limitations of the scale.

A further sentence is added however in the revised manuscript to read as follows: “These discrepancies were evident despite the fact that item lists in both M-CHAT and PAAS are directly related to core behaviors of ASD”.

## **Reviewer 2**

The paper is very interesting. PAAS may be indeed an effective tool in screening for ASD. The addition of a visual aid in the form of photographs improves its sensitivity. The authors claim that further study is indicated to evaluate the feasibility of using this instrument for community screening for autism.

1. The manuscript can be improved by adding a table comparing their system with the benchmark and add kappa values for different assessors.

The response to PAAS items was obtained from a self-assessment by parent of each child. Hence we are unable to provide kappa statistics on the data, as inter-rater reliability is not an issue.

**Reviewer 1**

No revision was requested.

All 3 reviewers are much appreciated for their positive comments about our paper and pointing out areas that needed revision.

Thank you

Hemamali Perera

Kamal Chandima Jeewandara

Sudarshi Seneviratne

Chandima Guruge