Reviewer’s report

Title: The development of a brief screener for autism using item response theory

Version: 0 Date: 19 Oct 2018

Reviewer: Amanda Brignell

Reviewer's report:

Thank you for the opportunity to review this paper. This paper uses a large sample of twins to conduct in order to construct a short-form of the ASD domain in A-TAC. The development of more precise and efficient screening tools for ASD is an important area and if a quicker tool is found to be as valid and reliable as previously developed screening tools it could have significant implications for referring healthcare professionals and the use of resources. Generally the paper would benefit from further editing around English grammar and writing style. I have made some suggestions in this regard but have not addressed all language issues or typographical errors. Please review the manuscript carefully for language.

Title

Suggest omitting the first 'A' in the title or using the word 'the' instead.

Abstract

Line 29. It may be more accurate to say "more precise" here. AD/HD should be written in full in the first instance.

Line 31. This sentence could be improved for clarity and grammar. Suggest it was the 'study' or 'authors' that aimed to determine… rather than the 'article'.

Line 36. Suggest using brackets around 'CATTS' if this is an abbreviation. An abbreviation with brackets after National Patient Register also needed.

Line 38. What specifically is meant by "investigated diagnoses"? Please specify. It would be useful to include information on the type of statistical analysis conducted in the methods section of the abstract.

Line 41. Suggest replacing the word 'in' with the word 'at'.

Line 41. Could the authors please clarify what they mean by "subjects in the far end of the autism trait continuum". It may be assumed you mean a greater number of ASD traits or more severe traits here but this was not entirely clear.

Line 42. It would be clearer regarding the term 'area under the curve' if the authors had already specified the type of statistical analysis to be used in the methods section of the abstract.

Line 43. It would be preferable to present the specific findings (i.e. statistical results) for both the predictive and previous validity analyses here. Can the authors also be more specific regarding the results for 'agreement' for previous validations of the A-TAC?

Line 45. It would be helpful to specify that the 17 items are from the A-TAC here just to be clear.

Background

Line 56. NICE guidelines recommend diagnosis in a multidisciplinary team but in many countries anamnestic investigations would not be considered a core component of the ASD diagnosis. Can you please provide references to support this recommendation? It is also suggested to add here that it is recommended diagnosis be made with reference to DSM or ICD criteria (as per NICE guidelines).

Line 61. This paragraph could be re-worded to make it clearer. The word 'however' may not be required here as the authors mention diagnosis of ASD in your previous paragraph and in this paragraph refer to screening/referrals.

Line 62. 'Less specialised instances' is to be expected if children are being referred for an assessment and not being diagnosed at this point. It is possible the authors are suggesting that autism specific tools are required (rather than generic) here. If so, this was not clear. Suggest re-wording this sentence.

Line 68. Suggest re-wording this sentence as it is quite long and hard to follow. Perhaps it would be clearer to refer to the tools being 'precise to autism' here or to explain what 'precise' refers to. This may make it clearer that the study is needed because instruments are needed that are BOTH precise and shorter to administer.

Line 69. Please provide references for the statement that these screening tools are 'effective' as there has been ongoing debate about specificity and sensitivity for screening tools for ASD, particularly in younger children.

Line 70. Suggest changing the word 'assessment' to either 'screening' or 'visit' to avoid confusing this with the diagnostic assessment.
Line 94. What is meant by CTT? Please write in full and then provide abbreviation.

Line 95. This is a very long sentence. Suggest a re-write/breaking into smaller sentences to assist readability.

Line 96. Suggest keeping consistency when describing the A-TAC autism 'module/domain'. That is, use just one term (domain OR module) as it is described in the A-TAC tool. The term module is used here yet in the section below language, social interaction and flexibility are described as modules.

Line 99. Suggest improving consistency between the wording of the aims as stated in the abstract, introduction and discussion.

The background section would benefit from more rigorous review of currently available screening tools. This would further support the rationale for the current study. For example, other than length of administration are there other limitations of currently available tools? What are their measurement properties (reporting the range would be adequate if word count is an issue) and how do they compare to the A-TAC?

Methods

Line 114. This is population-ascertained sample so the community diagnoses are unlikely to be completely uniform, however, in addition to ICD criteria it would be helpful to know what an ASD diagnosis usually involves in Sweden to become registered on the NPR. e.g. are there minimum requirements such as a multi-disciplinary team, specific professionals required to make the diagnosis, use of standardised diagnostic tools etc.

If there are no requirements other than ICD-10 criteria, and assessment was not uniform, this could be made clear and addressed as a limitation of the study (particularly given the NICE guidelines referenced in the background section which provide recommendations for diagnostic assessments). Further to this point, are all individuals with ASD in Sweden registered on the NPR or is it possible some children would not be registered?

Line 120. Were there any inclusion/exclusion criteria? Did the study include children of all intellectual abilities, all types of twins etc.

Please describe the sample further (if this information is available), such as in a participant characteristics table e.g. demographic information, age of diagnosis, socio-economic disadvantage, mean age (and range), any available characteristics of the children e.g. IQ. Otherwise, it is difficult for readers to know if the sample is representative (other than by prevalence and sex ratio). Did any of the children have missing data or were those with missing data excluded? If so, this should be clearly reported (with n). Perhaps reference to previous
studies that have reported more detail on the characteristics of the sample would be sufficient if available.

Line 173. What do the authors mean by 'pathological range' of the autism continuum? How is this cut-off determined? Please specify.

Results

Line 204. The authors report that the higher response categories were only endorsed for subjects who have a higher than average level of ASD. How was this determined? Did the NPR contain levels of severity of ASD?

Line 211. These items on the tool would appear to be less applicable if using the screener with much younger children who may not be developmentally expected to interact with their peers yet (e.g. are at the parallel play stage).

Line 221. What is meant by 'younger children' here? It was difficult to find information on age of diagnosis (mean, range etc) in the manuscript yet it is referred to in the text (e.g. line 216). If this information is available it should be provided in a table of characteristics/description of participants section.

Discussion

The authors have generally acknowledged most of the limitations and strengths of the study and have linked their findings to prior research. They have also addressed applicability.

Line 242. The authors emphasise the tool can assist with early diagnosis and intervention, yet the children were 9 years of age (and an unspecified number of 12 year olds) when they completed the screening tool. This means that it is difficult to know how this screening tool would perform if applied to much younger children. The age limitation is a significant one given the average age of diagnosis (around 4-6 years in developed countries) and the ages at which health professionals are likely to use a tool like this and at which they typically refer for diagnosis (substantially younger than 9 years of age). The authors should clarify for the readership whether or how this would influence the utility of the tool.

There is limited discussion around the fair result for predictive validity analysis. What implications does this have for the use of the screening tool?
Note: The statistical methods appear appropriate but I have not provided comments on the statistical approach/results as I do not have expertise in this area. I would suggest statistical review.

**Are the methods appropriate and well described?**
If not, please specify what is required in your comments to the authors.

Unable to assess

**Does the work include the necessary controls?**
If not, please specify which controls are required in your comments to the authors.

Yes

**Are the conclusions drawn adequately supported by the data shown?**
If not, please explain in your comments to the authors.

Unable to assess

**Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?**
If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

I recommend additional statistical review

**Quality of written English**
Please indicate the quality of language in the manuscript:

Needs some language corrections before being published
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