RESEARCH ARTICLE

Autism seminary for public engagement: evaluation of knowledge and attitudes of traditional medical practitioners in Mali [version 1; peer review: 1 approved, 1 approved with reservations, 1 not approved]

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Abstract

Background: Autism spectrum disorders (ASD) are stigmatizing in Africa and traditional medical practitioners occupy the first line of diagnosis and treatment due to the cultural perception of ASD, and the scarcity of conventional health services in Mali. We aimed to assess the knowledge, attitudes, and practices (KAP) concerning autism among traditional medical practitioners in Bamako, Mali.

Methods: We conducted a 6-week cross-sectional survey following a 1-day autism awareness seminary on September 9th, 2017 in Bamako. A questionnaire was designed to assess the KAP regarding autism. To assess their practices, parents of autistic children were asked about their experiences with traditional medical practitioners.

Results: Of the 37 study participants 67.60% were males and 56.8% had not heard about autism before the seminary. After the seminary, 73% claimed to understand the diagnosis criteria of autism, but only 16.2% could recall symptoms from all the three domains (reciprocal social interaction, verbal and nonverbal communication, and stereotyped behaviors/restricted interests) of a child development impaired by autism. Of traditional medical practitioners, 73% believed autism was caused by devils, God's will, bad luck and divine punishment of maternal misbehavior; 65% were used to treating mental illness, and 78.4% felt traditional healing was the only treatment option in autism. Negative attitudes towards autistic...
children were present in 18.9%, suggesting a very strong cultural mindset on autism.

**Conclusion:** Knowledge on autism was poor among traditional medical practitioners. A culturally tailored autism public engagement strategy is necessary to positively change the mindset of Malian traditional medical practitioners.

**Keywords**

autism, traditional medical practitioners, knowledge, attitudes, practices

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**Author roles:** Sangare M: Investigation, Methodology, Validation, Writing – Original Draft Preparation, Writing – Review & Editing; Dembele B: Conceptualization, Data Curation, Investigation; Toure A: Investigation, Methodology, Supervision, Writing – Review & Editing; Awandare G: Methodology, Resources, Supervision, Validation, Writing – Review & Editing; Kouyate M: Formal Analysis, Investigation, Methodology, Writing – Review & Editing; Diakite S: Formal Analysis, Project Administration, Supervision, Validation, Writing – Review & Editing; Togora A: Conceptualization, Investigation, Methodology, Supervision, Writing – Review & Editing; Coulibaly S: Formal Analysis, Investigation, Supervision, Validation, Writing – Review & Editing; Diakite M: Formal Analysis, Project Administration, Supervision, Validation, Writing – Review & Editing; Dolo H: Data Curation, Formal Analysis, Methodology, Writing – Review & Editing

**Competing interests:** No competing interests were disclosed.

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Introduction

Despite autism spectrum disorders (ASD) being ubiquitous in Africa (Bayou et al., 2008; Honikman et al., 2012; Lange, 1976; Samu, 1984), of the psychiatric disorders, ASD are poorly understood, neglected and stigmatizing across the continent (Abdullah & Brown, 2011; Stuart, 2005). Unlike in other continents, apart from those who had an autistic parent, most Africans are totally unaware of ASD. The lack of awareness of the general public regarding the symptoms, diagnosis and care of individuals with ASD (Arif et al., 2013) is mainly due to cultural beliefs and the scarcity of health services available to autistic families in sub-Saharan Africa. Successful management of children with ASD depends on early screening, diagnosis and psychosocial interventions (Guler et al., 2018), but in the African context, autistic children may have late or no diagnosis at all. Epilepsy is the most common comorbidity of ASD. Similar to epilepsy, the ethno-medical model or cultural representation of ASD in Africa may vary among different ethnic groups within the same country, but also between urban and rural settings (Pilard et al., 1992). The representation of local populations of a disease or disorder determines their demand for care and research services on a disease or disorder. Since Mali has a long tradition of the use of medicinal plants and incantations in treating mental illnesses, traditional medical practitioners (TMP) in Mali are on the first line of diagnosis and care for autistic families. However, cases of mismanagement of autistic children during the traditional medical practice has been reported based on word-of-mouth from parents of autistic children. No data are currently available that have assessed knowledge, attitudes and practices of TMP on ASD in Mali. In Mali, it is important to move on two fronts simultaneously (i) to establish a 2-way street collaboration between conventional and traditional medical practitioners and (ii) to conduct ASD awareness campaigns in the general population. The present study has focused on TMP as part of a general campaign for ASD public engagement in the general population, health professionals and school teachers.

Combining herbal medicines with conventional treatment seem to have a positive effect on the treatment of ASD in children (Bang et al., 2017). Traditional, complementary and alternative medicine in Sub-Saharan Africa are used in female reproductive health, hypertension, HIV, and tuberculosis to name a few (James et al., 2018). Poor-quality control and safety of medicinal plants represents a major obstacle that limits their proper and wider use. A major contributing factor is that traditional medical practices are still kept in secrecy, with poor to no written guidelines, and few reports or documentation of adverse reactions (Ozioma & Chinwe, 2019). Oyebode et al. reported that use of TM was less frequent than previously thought in Ghana, and South Africa, and therefore they raised doubts over the utility of seeking to harness TM for population health needs (Oyebode et al., 2016). Even though, available data may not suggest that herbal medicines are effective as an add-on treatment for ASD symptoms (Gasparotto et al., 2018), we echo the WHO Traditional Medicine Strategy 2014–23 to value the work of TMP especially in ASD and related conditions. In addition to determining the knowledge, attitudes, and practices (KAP) towards ASD of TMP’s, this study aimed to initiate interaction between our ASD research team and TMP to facilitate successful future collaboration.

Methods

We, the ASD research team at the Faculty of Medicine and Odonto Stomatology (FMOS), held 1-day autism awareness seminary for traditional medical practitioners on September 9th, 2017 at the FMOS in Bamako, Mali. The National Federation of Traditional Medical Practitioners in Mali (FeMATH) chose 40 members to participate to the seminar. Only those who were reachable after the seminar, who consented and fully responded to all the items on the study questionnaire, were included. We explained in French and Bambara, the most spoken local languages, the symptoms, risk factors, and treatment options during an oral presentation. The translation from French to Bambara was meant to minimize the effect of the language barrier in the transmission of your message on ASD to the TPM. From September 9th to October 14th, 2017, we conducted a 6-week cross-sectional survey to assess the knowledge, attitudes and practices of the participants using our study questionnaire (see extended data (Sangare, 2019)). Prior to its use, our study questionnaire was evaluated by a medical anthropologist of the department of public health at the FMOS and it was administered to 20 adult volunteers to check the completeness of the responses. On September 21st, 2018, a seminar was held at the FMOS to train in ASD screening 15 ambassadors of autism in Mali including malaria researchers at the Malaria Research and Training Center (MRTC) at the FMOS, an ex-minister of higher education and scientific research of Mali and famous female journalists of the national TV and radio stations. During seminar, six (6) parents of autistic of the association Djiguïya gave testimonials in live before private and national TV. A professional journalist and a medical student interviewed before the media four of the six parents of autistic children about their experiences with traditional medical practitioners. While the journalist asked the questions and recorded all the interviews using a Dictaphone, the medical student wrote the answers to the questions in the space provided on the study questionnaire. Data were analyzed using SPSS version 20.0. Trend chi square was used to detect any difference between the traditional medical practitioners categorized by number of years of practice (≤7 years (n=2), 8–20 years (n=13), 21–40 years (n=17) and ≥40 years (n=5)).

Our study protocol (along the consent form and questionnaires) was approved by the IRB at the FMOS on August 23rd, 2016. Each participated traditional medical practitioner was consented and compensated for his/her participation to the seminar. As convened with the FeMATH and agreed by the participants, the compensation for the participation to the survey onwards was given to the FeMATH. The rates for compensation were approved by the IRB to prevent undue coercion. Personal identifiers were not collected at the time of the survey. In addition to compensation for participation to our study, the roundtrip (Downtown Bamako-FMOS-Downtown Bamako) transport fee was reimbursed for the parents of autistic children.

Results and discussion

In this study, we surveyed 92.5% (37/40) of the attendees among the traditional medical practitioners who participated to our ASD awareness seminary (see underlying data (Sangare, 2019)). The sex ratio was 2 Males for 1 female (Figure 1). We were aware of the possibility of selection bias when we addressed an invitation
letter to the FeMATH. We understood that the most literate would be selected. In addition, this study was conducted in an urban setting. Therefore, our results may not be representative of the traditional medical practitioners across the country. Nevertheless, the ultimate goal of this autism awareness seminar was to initiate collaboration with traditional medical practitioners for a number of reasons. First, the general population strongly adheres to the cultural perception of autism. In Mali, ASD is explained by supernatural causes such as a curse, a divine punishment for a disobedient spouse, a spirit possession or the anger of devils. Similar supernatural explanation of child developmental disorders was found to be common among nursing staff in Ethiopia (Tilahun et al., 2016). Consequently, traditional medical practitioners are involved in initial autism diagnosis and treatment in Mali. Second, health literacy regarding autism, even among health professionals, is low, and the scarcity of appropriate health services available to autistic families drives parents towards traditional therapy. Third, traditional therapy is so embedded in Malian culture that it is used concomitantly with conventional medicine. Medicinal plants are integral part of the health care system in Mali. As long as the lack of public awareness towards children with autism persists in Mali, it is better to collaborate and cooperate with traditional medical practitioners for successful ASD research. There are, however, numerous challenges to overcome.

After the 1-day autism awareness seminar, only 16.2% (6/37) could recall symptoms from all the three domains of a child development affected in autism (Table 1), but 73% (27/37) claimed to understand the diagnosis criteria of autism (Table 2). Of course, one day of training is not sufficient, and it is unrealistic to expect every Malian traditional healer to understand autism from the training. People are aware of autism, but many do not fully understand the struggle of children with autism (Gray, 1993; Shamsuddin & Rahman, 2014). In the past three years, our experience in Mali is that a talk given by a health professional on ASD in simple terminology for lay people is less effective than the testimonials of the parents of autistic children about their daily struggle. ASD is a complex subject, even for physicians. A tailored autism training program (Mohamed Nur Adli et al., 2017) will allow us to select some trainees as focal points to collaborate with the ASD research team. They will be likely to better understand ASD and be more empathetic towards autistic children compared to their friends, families and their colleagues.

<table>
<thead>
<tr>
<th>Questions (Q)</th>
<th>Response</th>
<th>Experience of traditional medical practitioners (years of practice)</th>
<th>Statistics</th>
<th>Total</th>
<th>2 for trend, p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1. Did you hear about autism before the seminar?</td>
<td>Yes</td>
<td>0 (0%)</td>
<td>5 (38.5%)</td>
<td>9 (52.9%)</td>
<td>2 (40.0%)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>2 (100%)</td>
<td>8 (61.5%)</td>
<td>8 (47.1%)</td>
<td>3 (60.0%)</td>
</tr>
<tr>
<td>Total</td>
<td>2 (100%)</td>
<td>13 (100%)</td>
<td>17 (100%)</td>
<td>5 (100%)</td>
<td>37 (100%)</td>
</tr>
<tr>
<td>Q2. Did you understand how autism is diagnosed?</td>
<td>Yes</td>
<td>0 (0%)</td>
<td>10 (76.9%)</td>
<td>14 (82.4%)</td>
<td>3 (60.0%)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>2 (100%)</td>
<td>3 (23.1%)</td>
<td>3 (17.6%)</td>
<td>2 (40.0%)</td>
</tr>
<tr>
<td>Total</td>
<td>2 (100%)</td>
<td>13 (100%)</td>
<td>17 (100%)</td>
<td>5 (100%)</td>
<td>37 (100%)</td>
</tr>
<tr>
<td>Q3. Do you treat mental illnesses?</td>
<td>Yes</td>
<td>1 (50%)</td>
<td>7 (53.8%)</td>
<td>12 (70.6%)</td>
<td>4 (80%)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>1 (50%)</td>
<td>6 (46.2%)</td>
<td>5 (29.4%)</td>
<td>1 (20%)</td>
</tr>
<tr>
<td>Total</td>
<td>2 (100%)</td>
<td>13 (100%)</td>
<td>17 (100%)</td>
<td>5 (100%)</td>
<td>37 (100%)</td>
</tr>
<tr>
<td>Q4. What are the symptoms of the triad of autism?*</td>
<td>Excellent</td>
<td>0 (0%)</td>
<td>3 (23.1%)</td>
<td>3 (17.6%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td></td>
<td>Correct</td>
<td>0 (0%)</td>
<td>8 (61.5%)</td>
<td>11 (64.7%)</td>
<td>4 (80%)</td>
</tr>
<tr>
<td></td>
<td>Incorrect</td>
<td>2 (100%)</td>
<td>2 (15.4%)</td>
<td>3 (17.6%)</td>
<td>1 (20%)</td>
</tr>
<tr>
<td>Total</td>
<td>2 (100%)</td>
<td>13 (100%)</td>
<td>17 (100%)</td>
<td>5 (100%)</td>
<td>37 (100%)</td>
</tr>
</tbody>
</table>

* Citation of symptoms in three domains (excellent), in two domains (correct), one domain or less (incorrect).
Table 2. Attitudes and beliefs of traditional medical practitioners about their perceived causes of autism.

<table>
<thead>
<tr>
<th>Traditional medical practitioners</th>
<th>Experience of traditional medical practitioners (years of practice) N=37</th>
<th>Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>≤ 7</td>
<td>8 – 20</td>
</tr>
<tr>
<td>Perceived causes of autism</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conform*</td>
<td>0 (0%)</td>
<td>2 (15.4%)</td>
</tr>
<tr>
<td>Not conform**</td>
<td>0 (0%)</td>
<td>9 (69.2%)</td>
</tr>
<tr>
<td>I don't know</td>
<td>2 (100%)</td>
<td>2 (15.4%)</td>
</tr>
<tr>
<td>Total</td>
<td>2 (100%)</td>
<td>13 (100%)</td>
</tr>
<tr>
<td>Attitudes towards an autistic child</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>0 (0%)</td>
<td>2 (15.4%)</td>
</tr>
<tr>
<td>Negative</td>
<td>0 (0%)</td>
<td>2 (15.4%)</td>
</tr>
<tr>
<td>I don't know</td>
<td>2 (100%)</td>
<td>9 (69.2%)</td>
</tr>
<tr>
<td>Total</td>
<td>2 (100%)</td>
<td>13 (100%)</td>
</tr>
<tr>
<td>An autistic child brings to the parents</td>
<td></td>
<td></td>
</tr>
<tr>
<td>wealth</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>poverty</td>
<td>0 (0%)</td>
<td>2 (15.4%)</td>
</tr>
<tr>
<td>I don't know</td>
<td>2 (100%)</td>
<td>11 (84.6%)</td>
</tr>
<tr>
<td>Total</td>
<td>2 (100%)</td>
<td>13 (100%)</td>
</tr>
</tbody>
</table>

*Conform: in line with evidence-based biomedical (environmental or biological) causes of ASD  
**Not conform: preternatural causes such as ancestral spirits, enemies, sin or the devil, divine punishment, curse, etc…

The majority of the traditional medical practitioners (65%, 24/37) were used to treating mental illness (Table 1), and 78.4% (29/37) thought autism was treatable solely through traditional therapy (Table 3). The majority of attendees believed autism was caused by devils, god’s will, bad luck and divine punishment of maternal misbehavior (Table 2). These findings were quite illustrative of the hard tasks ahead for a successful collaboration with traditional medical practitioners. We identified several take-away lessons from the seminar. First, any training program for traditional medical practitioners should initially address the cultural representation of autism in Mali. In many developing countries, people strongly believe that traditional medical practitioners can treat mental illness, and even prefer them to psychiatrists (Bener & Ghuloum, 2011). Second, a possible conflict of interest may exist here. Despite the seminar attendance, some traditional medical practitioners still feel they are more qualified to diagnose and care for autistic families. The financial gain from caring for such families may be crucial in perpetuating such mindset. Finally, the group of attendees who were able to recall the triad of autism symptoms will be a good start for further training and collaboration for referrals. People who know the signs and symptoms of autism and/or live with an autistic individual are more likely to be aware of ASD (Anwar et al., 2018).

Negative attitudes towards autistic children were present in 18.9% (7/37) suggesting a very strong cultural prejudice towards autism (Table 2). The testimonials of the parents of autistic children may not be representative of traditional medical practitioners, but their persisting negative attitudes after an ASD training seminar are concerning. This could be a double-edged sword, on one hand traditional medical practitioners may learn about ASD, change their mindset and practices and collaborate in ASD research as expected. On the other hand, they may use the knowledge gained to advertise their services as such without any subsequent collaboration. This way, they will use the conventional medicine approach to explain in local radio stations the signs and symptoms of the disease, but they revert back to the traditional therapy approach for treatment. There is precedence for this scenario, having already occurred with chronic medical or surgical conditions such as diabetes, high blood pressure, asthma and hemorrhoids in Africa (Abondo-Ngono et al., 2015).

To establish if experience had an effect on attitudes and knowledge on autism, correlation between the number of years of experience with the knowledge and attitudes of the traditional medical practitioners was tested. No significant association was identified, however, for traditional medical practitioners who had 8 years or more of experience the cultural perception of autism in terms of perceived causes (supernatural explanatory causes) were prevalent, 69.2% to 82.4% (2=2.44; P= 0.12) (Table 2). Similarly, a higher proportion of traditional medical practitioners from 69.2% to 70.6% (2=0.72; P= 0.40) and from 80% to 80.6% (2=2.44; P= 0.12) declined to reveal the attitudes and beliefs towards autistic children and their mothers respectively (Table 2). It was worth noting that 70.6% to 88.2% of the most experienced traditional medical practitioners thought the traditional treatment remain the only option to care for autistic families (2=0.25; P= 0.62) (Table 3). Taken together, we have learned from these data that the least experienced...
traditional medical practitioners could be more suitable for autism training, while the most experienced would be more inclined to collaborate in medical plant screening to value their products. Such collaboration could drastically change, in a positive manner, the current experience of parents of autistic children with traditional medical practitioners in Mali.

“My son is 14 years old. I spent a good fortune in sacrifices and consultation fees with traditional medical practitioners. However, I saw no positive change in my child behavior. For instance, he has been attending first grade since he was seven and he is still dependent on us.” a father of an autistic child in Mali

“My son is 12 years old. A friend of mine told me that my son was possessed and advised me to contact a traditional healer abroad. I spent three days and three nights in a dense forest in Guinea. My son had to bear the hardship to late night rituals. I paid a red cow for the healer and lots of money for no result. There is nothing more expensive for a child, but I was exhausted financially. The autism project was relieving for me personally.” a father of an autistic child in Mali

“My son is 18 years old. At birth, he did not cry. I spent weeks at a hospital in Gabon. In his early infancy, I remarked he was very different from other kids. Despite my Muslim faith, I frequented a church seeking for cure for my son. I had to take baths with blessed water and spend hours naked inside the church. Our family economy was ruined and my husband asked me to bring our child back home to Bamako three years ago. My mom has been helping me to care for the child. My family in law abandoned me. A traditional healer buried my son once up to his neck for three hours. I could not bear his sufferings and asked to have my son back even if he was not cured. The healer said, “Take your son, but I am not accountable for the treatment fees.” I am wrongly mislabeled as a bad person. I did not do anything wrong to deserve such treatment from people.” a mother of an autistic child in Mali

“My son is 16 years old. I spend $100 in drug prescription every month. I tried every traditional healing option without success. Once, a healer asked my wife and I to bring our child in the forest for special rituals. According to him, our child would undergo a ritual after which he would be either cured or metamorphosed into a serpent. We decided not to risk the life of our child. I gave countless animals for sacrifice and spent plenty of money of traditional treatment. I will be contented with the medical prescription.” a father of an autistic child in Mali

It is obvious from the testimonials above that parents of autistic children use the services of traditional medical practitioners in Mali. The financial and emotional burdens of such services outweigh by far the expected benefits of the treatment.

**Conclusion**

Training traditional medical practitioners in ASD could empower them with useful medical knowledge. They can collaborate with conventional medical practitioners and the ASD research team in Mali. Such collaboration could lead to screening medicinal plants they use to treat mental illnesses for therapeutic benefit, as these. Medicinal plants may have as yet undetermined indications in the symptomatic treatment of ASD.

**Data availability**

**Underlying data**


This project contains the following underlying data:

- Database Traditional Medical Practitioner_FINAL_.Bakary Dembele_21.12.18.xlsx (Questionnaire responses from participants)
Extended data

This project contains the following extended data:

- Study questionnaire. 04-10-2019. docx.docx (study questionnaire)

Data are available under the terms of the Creative Commons Attribution 4.0 International license (CC-BY 4.0).

Grant information

This study was supported by the African Academy of Sciences under a DELTAS Africa Initiative grant [DEL-15-007] as part of a West African Centre for Cell Biology of Infectious Pathogens (WACCBIP) Postdoctoral Fellowship to MS. The DELTAS Africa Initiative is an independent funding scheme of the African Academy of Sciences (AAS)’s Alliance for Accelerating Excellence in Science in Africa (AESA) and supported by the New Partnership for Africa’s Development Planning and Coordinating Agency (NEPAD Agency) with funding from the Wellcome Trust [107755/Z/15/Z] and the UK government. The views expressed in this publication are those of the author(s) and not necessarily those of AAS, NEPAD Agency, Wellcome Trust or the UK government.” MS is also a grantee of the University of Sciences, Techniques and Technologies of Bamako (USTTB), Ministry of Innovation and Scientific Research of Mali.

Acknowledgments

We acknowledge the students and research assistants at the FMOs who helped Dembele B to conduct the survey. We thank the FeMATH for the collaboration and the association “Djiguiya” for sharing their personal hardship through their journey to seek cure and care for their autistic children. A special thanks to both Mr Marignouma Konate, our communication specialist and Mr Benjamin Sagala, the professional journalist for the media coverage and helping with the interview.

References


Open Peer Review

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Version 1

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Susan R. Leekam
School of Psychology, Cardiff University, Cardiff, UK

This article describes a highly important topic. The work carried out has the potential to make a valuable contribution in raising the awareness of traditional medical practitioners in Mali. Currently the conclusions do not map onto the results and my view is that the Introduction, Methods, Results and Discussion would all need to be reformulated in order to make the evidence itself support the case that is being made. Because of the limitations of the evidence (e.g. small sample sizes, types of questions asked), the case that is being made would also need to be simplified. Because this is such an important area of work which deserves to be reported, I encourage the authors to consider the points below.

1. The reports from parents on p6. are very powerful and important in their own right. However the research study is about traditional medical practitioners and the parent summaries are disconnected from this study. How are these parent reports relevant? Why are they included? Were these parents being treated by the professionals in the study - if so which ones? If they are not directly connected to the data, could the reports be placed in the Introduction instead of the Discussion and they would then to set up the rationale for the study?

2. The introduction is clearly written but if possible it would help to highlight that autism is thought to be a psychiatric illness in Mali while the DSM-5 describes it, not as an illness, but as a neurodevelopmental disorder. Also the statement (paragraph 2) that herbal medicines combined with conventional treatment has a positive effect for children with ASD needs to be backed up with specific evidence (the James, 2018 reference refers to non-ASD studies that are not relevant to neurodevelopmental disorders. Also, although the aim of the seminary was to initiate interaction and collaboration, this does not seem to be an aim of the study itself (if so there should be related data).

3. The study protocol was approved by the IRB at the FMOS. Please can you say what this is and refer to the journal's requirements for ethical review and how they were met as well?

4. Results and Discussion:
a) Figure 1 could be described in the text and a chart is not needed.

b) I looked at the questionnaire file and had difficulty mapping the wording from some of the questions from that file to the tables. Could the actual questions asked be provided in the text?

c) I had trouble linking Q2 in Table 1 “Did you understand how autism is diagnosed” to the questions in the questionnaire. Is it possible to compare the results of Q11 (Did you know ASD before the seminary) to Q12 or 13? This would capture the effect of knowledge gain from the seminary.

d) Statistics:

(i) The sample size of 37 is very small. The further divisions into 4 subcategories of years of experience (e.g. Table 1) lead to very small cells which are not meaningful to compare statistically. The category of less than 7 years in particular is not a meaningful subdivision with very tiny numbers.

(ii) All the results in Table 1 are non-significant and probably because the cell sizes are just too small to be tested. It is not useful to include the final significance column. Would it not be more useful to compare age of practitioner (also in the data file and a continuous variable) with yes/no response instead of the years of experience variable which has limitations for testing significance. A different non-parametric test could then be used instead to create the same result that would be more valid. The statement on p.5–p.6 “We have learned from these data that the least experienced traditional medical practitioners could be more suitable for autism training...” cannot be supported from the non-significant data presented but if a different analysis was used comparing age with total score this might be another way to test this.

(iii) When analysing Q4 it might be worth thinking of putting the Excellent and correct rows together as DSM-5 ASD now has two main domains instead of three.

(iv) In Table 2, the inclusion of the response “I don't know” dominates the answer for the question about “Attitudes” and “And autistic child brings to parents”. This makes it impossible to draw any conclusions about positive versus negative attitude (only 4 versus 7) or wealth versus poverty (2 versus 4). The ‘don't know’ response swamps the others and indicates that there was some problem with the question. Once again it would be more helpful to include the actual question that participants were asked which is listed in the supplementary file.

For Table 2 I recommend leaving only perceived causes of autism removing the other two question. For Table 1 I recommend a comparison only between Q11 and 12 from the questionnaire itself and inclusion of results from Q13 (Q4 in the table), using the questions that were actually used in the questionnaire and remove the question about mental illness. The Discussion and conclusion would have to be rewritten to follow up the new results and interpretation.
Is the work clearly and accurately presented and does it cite the current literature?
Partly

Is the study design appropriate and is the work technically sound?
Partly

Are sufficient details of methods and analysis provided to allow replication by others?
Partly

If applicable, is the statistical analysis and its interpretation appropriate?
No

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
No

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Autism, neurodevelopmental disorders, developmental psychology

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Reviewer Report 19 August 2020
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David M. Ndetei
Department of Psychiatry, Africa Mental Health Foundation, Nairobi, Kenya

This is a very well written paper with good background information. It addresses a very important condition, i.e. ASD, that is poorly understood and appreciated by practitioners. The thrust of this study is that parents with children with ASD tend to consult Traditional Healers (TH) as first contact of care and therefore the need for engagement with the TH to promote understating of an alternative model i.e. a bio-psychosocial model. Hopefully, this will facilitate collaboration between TH and the biomedical model. The children with ASD will be the ultimate beneficiaries. The results and discussion are combined, and that it is good for such a study design. The style of writing is good, although one can discern that the thoughts and constructs are in French but that is perfect.
Only a few points for action. Diagram 1 takes too much space without adding any value. It could be summarized in one sentence in the narrative more so given the small sample size. There are a few editorial issues that can be easily addressed e.g. under Methods, line 27 “....parents of autistic of the association....". Still, under Methods, 2\textsuperscript{nd} paragraph, 3\textsuperscript{rd} line “Each participated traditional......”. There could be others I did not notice.

Conclusion: Accept with minor editorial corrections. It makes an excellent contribution.

\textbf{Is the work clearly and accurately presented and does it cite the current literature?}  
Yes

\textbf{Is the study design appropriate and is the work technically sound?}  
Yes

\textbf{Are sufficient details of methods and analysis provided to allow replication by others?}  
Yes

\textbf{If applicable, is the statistical analysis and its interpretation appropriate?}  
Not applicable

\textbf{Are all the source data underlying the results available to ensure full reproducibility?}  
Yes

\textbf{Are the conclusions drawn adequately supported by the results?}  
Yes

\textbf{Competing Interests:} No competing interests were disclosed.

\textbf{Reviewer Expertise:} Psychiatry and mental health

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

\textbf{Author Response 19 Aug 2020}  
\textbf{Modibo Sangare}, USTTB, Bamako, Mali

Thank you very much Professor David M. Ndetei, Africa Mental Health Foundation, Nairobi, Kenya for your positive and unbiased review of our manuscript. On behalf of the authors, I am proud to realize we have experienced mental health investigators that still value locally important and culturally relevant basic research studies especially on autism spectrum disorders. Below are our responses to your comments.

\textbf{Comment 1:} This is a very well written paper with good background information. It addresses a very important condition, i.e. ASD, that is poorly understood and appreciated by practitioners. The thrust of this study is that parents with children with ASD tend to consult Traditional Healers (TH) as first contact of care and therefore the need for
engagement with the TH to promote understating of an alternative model i.e. a bio-
psychosocial model. Hopefully, this will facilitate collaboration between TH and the
biomedical model. The children with ASD will be the ultimate beneficiaries. The results and
discussion are combined, and that it is good for such a study design. The style of writing is
good, although one can discern that the thoughts and constructs are in French but that is
perfect.

**Response 1:** Thank you for understanding the spirit of this study and its relevance in the
African context. To ensure you that you thought right about our paper. Professor Sue
Leekam, Emerita Professor, Cardiff University Centre for Developmental Science read it with
interest. On September 19, 2019, she emailed me the link to her training materials on
autism for professionals (available on request).

**Comment 2:** Only a few points for action. Diagram 1 takes too much space without adding
any value. It could be summarized in one sentence in the narrative more so given the small
sample size.

**Response 2:** Figure 1 should be deleted and replaced by “The sex ratio of our study
participants was 2 males for 1 female”.

**Comment 3:** There are a few editorial issues that can be easily addressed e.g. under
Methods, line 27 “….parents of autistic of the association….”.

**Response 3:** “During seminar, six (6) parents of autistic of the association Djiguiya gave
testimonials in live before private and national TV,” should read “During the seminar, six (6)
parents of autistic children from the association “Djiguiya” gave testimonials in live before
private and national TV.”

**Comment 4:** Still, under Methods, 2nd paragraph, 3rd line “Each participated
traditional......”. There could be others I did not notice.

**Response 4:** “Each participating traditional medical practitioner was consented and
compensated for his/her participation to the seminar.” should read “Each
participating traditional medical practitioner was consented and compensated for his/her
participation to the seminar.”

**Comment 5:** Conclusion: Accept with minor editorial corrections. It makes an excellent
contribution.

**Response 5:** Thank you for your helpful comments. This study helped hundreds of autistic
children to be visible and to benefit a medical care (anti epileptic drugs, risperidone, ritalin,
etc...) for free from our research team. Up to date, we have enrolled and included 116
autistic children into our ASD genetic research protocol. Over 60 other are in stand by to be
enrolled upon the availability of the additional research fund.

**Competing Interests:** There is no conflict of interest.
Muideen Owolabi Bakare
1 Federal Neuro-Psychiatric Hospital, Enugu, Nigeria
2 Childhood Neuropsychiatric Disorders Initiatives, Enugu, Nigeria

- This work is poorly written with a number of grammar corrections needed. The relevant literature review related to the African sub-region is deficient.

- The objective of this study is not clearly understood - is it to assess a baseline knowledge and attitude of traditional healers about Autism Spectrum Disorder or to assess the impact of the seminar conducted on the knowledge and attitude of the traditional healers? In which case, there should have been a comparable data of baseline and post-intervention knowledge and attitude assessments. So, the methodological design is poor.

- The data provided in the manuscript is not detailed enough to afford replication of the study. The basis for the statistical method used is unclear. The link to the questionnaire used for the study is not accessible.

- I have my reservations about the conclusion being supported by the results.

**Is the work clearly and accurately presented and does it cite the current literature?**
Partly

**Is the study design appropriate and is the work technically sound?**
No

**Are sufficient details of methods and analysis provided to allow replication by others?**
No

**If applicable, is the statistical analysis and its interpretation appropriate?**
No

**Are all the source data underlying the results available to ensure full reproducibility?**
No

**Are the conclusions drawn adequately supported by the results?**
No

**Competing Interests:** No competing interests were disclosed.

**Reviewer Expertise:** Neurodevelopmental Disorders across Life Span.

I confirm that I have read this submission and believe that I have an appropriate level of...
expertise to state that I do not consider it to be of an acceptable scientific standard, for reasons outlined above.

Author Response 28 Jul 2020

Modibo Sangare, USTTB, Bamako, Mali

I read with a great interest the comments from the reviewer. I am grateful to him for his time and effort. Could he provide us with other comments that (if addressed) will improve the overall quality of the paper?

Thank you
The corresponding author

Competing Interests: There is no competing interests. Nigeria and South Africa are the most advanced African countries in autism research.