

Autism spectrum disorder Through the Lens of the Theory of Mind: African Perspectives

Maximus M. Sefotho

ORCID 0000-0002-5270-5243

msefotho@uj.ac.za

Charity N. Onyishi

ORCID 0000-0003-4047-7850

cnyishi@uj.ac.za

Department of Educational Psychology, University of Johannesburg, South-Africa

Corresponding author: Charity N. Onyishi

Acknowledgements

Both researchers were involved in the inquiry and writing of this article.

Funding

We declare that this article was funded under the auspices of the second author's postdoctoral fellowship at the University of Johannesburg.

Conflict of interest

We declare no conflict of interest.

ABSTRACT

The prevalence of Autism Spectrum Disorder (ASD) in Africa is increasing unprecedentedly. Yet, most researches and practices in ASD within African communities employ Eurocentric approaches to identification, screening, diagnosis, and interventions. This tends to increase the risk of late diagnosis and comorbidity clamoured in Africa, given that Eurocentric approaches are inadequate in expounding ASD for typical African cultural diversity. Extant literature offers a general trajectory to the development and understanding of ASD without specific attention to cultural variability. This article drew from Baron-Cohen's mind-blindness theoretical framework to explain the ASD trajectory in Africa African context. We drew from African contextualization of the ToM and ASD to argue for an augmented mind-blindness framework for parents-oriented ASD surveillance in African communities. We further propose that ASD can be screened between the ages of 5 and 12 months through Afro-centric frameworks. The implications of our findings are that content and context are important variables in the research and practices of ASD.

Key Words: Theory of Mind, mind-blindness, Autism Spectrum Disorder, African perspectives.

INTRODUCTION

In this article we argue that the Baron-Cohen mind-blindness theory of autism (Baron-Cohen, 1997) is Eurocentric and fails to capture African perspectives in placing the theory of mind (ToM) in parallel with ASD. African perspectives emphasise "human functioning" that contextualises humans as both material and spiritual beings conscious about subjective and socially-constructed realities (Myers & Speight, 2010). Leshota and Sefotho, (2018) argue that for Africans to progress in the area of disabilities, including neurodevelopmental disorders, there is a need to begin to reconceptualise the Eurocentric explanations of culturally informed human psychology, thereby projecting African cultural specifications. Initially, Africans believed that ASD was a disability of the high-income industrialised countries (Sanua, 1984) because of their low knowledge and limited interest in research, diagnosis and intervention of neurodevelopmental-related disorders including ASD (Dixon, Badoe, & Owusu, 2015). This poor understanding of ASD was not necessarily that the disorder did not exist in Africa (Bakare, Agomoh, Ebigbo, Eaton, Okonkwo, Onwukwe, & Onyeama, 2009; Bakare, Ebigbo, Agomoh, Eaton, Onyeama, Okonkwo,... & Aguocha, 2009), but was it was beclouded by fallacy across inherent cultures in African communities (Bakare, Ebigbo, Agomoh, & Menkiti, 2008).

Thus, the cultural societies rarely have any culturally based scientific/psychological framework to attend to the needs of individuals with ASDs. This could explain why the ASD group has attracted less research attention in African communities. This dismal stance of Africans in research and intervention in autism arises from their unreasonable subscription of African psychology and research on mainstream psychological epistemology which rarely considers differences across cultures and contexts (Idemudia, 2004; 2013; 2015; Makhubela, 2016; Matoane,

2012a). Extant research suggests that explanation and aetiology of ASD and other neurodevelopmental disorders cannot be fully captured outside this socio-cultural stance (Lazarus, 2009; Horton Jr., Carrington, & Lewis-Jack, 2001).

Neurodevelopmental disorders including ASD have been described as representing some of the greatest burden of disease in children and adolescents. ASD is a neurodevelopmental disorder symptomised in social impairments, communication deficit, and restricted repetitive and stereotyped patterns of behaviour (Centers for Disease Control and Prevention (CDC), 2012). ASD threatens both the individual's social relevance and functional contribution to the family and society. In severe cases, persons with ASD may not be able to take care of self and so constitute a considerable burden to family and caregivers. The World Health Organization (WHO) (2013) describes autism as a growing global public health concern due to increasing awareness of the disorder. Current studies show that Africa is not an exception to the pervasiveness of ASD across the world (Audu & Egbochuko, 2011; Lagunju et al., 2014; Bakare & Munir, 2011b; Chinawa, Manyike, Aniwada, Chinawa, Obu, Odetunde, Nwokocha, Ibekwe, 2016). Studies reveal about 1.5% prevalence of ASD in Africa (Sajedi, Vameghi, & Kraskian Mujembari, 2014). More recently, research recorded a heightened prevalence of 2.3% (Lagunju et al., 2014) and 2.9% (Chinawa, et al., 2016) among school children in South East Nigeria.

Many communities in Africa have little awareness of ASDs (Abubakar, Ssewanyana, & Newton, 2016), and affected children are less likely to be noticed early by primary care providers, such as parents and caregivers (Miles, 2011; Bakare, et al., 2008; Marlow, Servili, & Tomlinson, 2019) for further assessment and intervention. Literature shows that the few autism studies done in Africa are done completely under the framework of mainstream Western psychology (Nwoye, 2015), which rarely adequate for understanding behavioural deviations in African contexts (Bölte & Richman, 2019; Nwoye, 2017). In concordance, Ebede-Ndi, (2016) lamented the need for an African identity that can be used as a remedy to a Eurocentric domination of psychology that does not prioritise black communities' specific needs. Currently, research in ASD is lacking as to efforts towards finding structure and presentation of the disorder in a way that can equip parents and primary health-care practitioners for early diagnosis and intervention on ASD in Africa.

African standards for non clinical screening of autism differ significantly from Western-European and Asian standards due to a number of factors such as cultural diversities even among specific ethnic groups (Chumbow, 2009), a lack of developed culturally valid standard of measurement (Mc Grath, 2009), and the dearth of policy instruments (Abubakar, et al., 2016). Tangential to this is the stigmatisation associated with the disorder in Africa, which limits serious inquiries into the problem (Bakare & Munir, 2011). Majority of ASD children in Africa were diagnosed at about 8 years when they are already enmeshed with comorbid disabilities such as intellectual disability (ID) and severe speech delay (Bakare & Munir, 2011; Mankoski, Collins, Ndosu, Mgalla, Sarwatt, and Folstein, 2006; Mpaka, Okitundu, Ndjukendi, N'situ, Kinsala, Mukau,... & Steyaert, 2016; Ruparelia, Abubakar, Badoe, Bakare, Visser, Chugani,... & Skuse, 2016). These problems are linked to poor knowledge among parents, teachers and health personnel about ASD, which are associated with lack of culturally-based frameworks for screening, diagnosis and interventions in African communities. This study draws from the Baron-Cohen mind-blindness theory to conceptualise ASD as a disorder of ToM from African view-points; and to argue that ASD could be assessed between 5-14 months of infancy through a non-clinical parent-oriented screening and concerns (Herlihy, Knoch, Vibert, & Fein, 2015).

The Mind from African Perspectives

An average African holds a holistic worldview about "what is" (the human epistemology and or the universe), which is a "both-and" perspective against "either-or perspective" of the Eurocentric idea (Goggins, 1996; Nwoye, 2015; 2017). The Africans view the world as an account of two components: the visible/material component and the invisible/ non material or spiritual component (Nwoye, 2013, 2014, 2015a, 2017). African perspectives of what "the mind" is do not deviate from this line of thought. Accordingly, Africans believe that the person is essentially a spiritual and mental being and the spirituality and mentality of a person is epitomised in the Mind. The Basotho of Lesotho consider a human being as a composition of '*mele* (body), *pelo* (mind) and *moea* (spirit or soul). In this context, humans can be viewed from two sides, the mental and the physical which are attributable to an underlying substance. In Igbo cultural group in Nigeria, human beings are called *mmadu*, derived from two Igbo words- *mmuo*, meaning spirit and *ndu*- meaning life. So, to Ibos, *human beings are life spirits*. They also believe in *uche bu mmadu*, which means that humans (*mmadu*) are humans because of the presence of *mind (uche)*. They believe that in as much as humans are made up of body and mind, the mind is the engine that drives the body, without which the body is useless.

African cultural contexts believe that the mind is the mediator between the physical and spiritual world, with the view that both are complementary to each other. Basotho similarly believe that the spirit or the soul is more

powerful than the body. Thus, the African viewpoint about minds, thoughts and mentality informs their collective existence, beliefs in vision and divination as ways of remedying problems associated with body-mind dissensions. Africans believe that mind is given to all men to understand, predict, and manage actions in day-to-day life in a socially plausible manner as a connection between humans and spiritualism (Idemudia, 2015). Africans also believe in the mind as a seat of intuition and knowledge (Aguwa, 1995), which is anchored on the spiritual\biological dispositions. The Africans believe that the mind is influenced by the culture of the society. It is for that reason that Basotho refer to: *kholo ea kelello* – mental maturity as an inevitable step in the process of human development. These are evinced in diverse systematic ways African cultures bring to bear through the process of dialogue, the moral visions of a culture, transmitted by its social teachers; through stories, proverbs, divinations, and myths (Nwoye, 2006; 2017), in a bid to developing sound mind and making the person's mind become realizable. Hence babies are seen as spirit-filled (mind-filled) beings who already have in a miniature measures, the coded minds which unveil into full-fledged/mature minds, through socialisation and learning socially informed standard ways of thinking, inferring, perceiving and predicting.

So, anomaly in the mind is a spiritual issue and could begin from birth. Children who smile automatically at about 1 month according to African beliefs are learning to be aware of self, consciousness and emotion. And in that way, the child begins to gain consciousness of self, and then other. They believe that as the child becomes aware of people in the physical, he gradually loses the direct sight of the spirits and informal socialisation takes it from there.

African communities through cultural dynamics recognise that the mind is essential for individual's effective participation within the cultural milieu (Enserink, Patel, Kranz, & Maestu, 2007). From birth of a child, most African cultures recognise the importance of child participation and involvement for both social and cognitive development. Culture provides a platform for taking care of child development in those respects. For instance, some communities, development of the mind is nurtured from birth of a child, when the mother starts to use their palms to test the eye gazing capacity of a child, by moving the palm both sides and watching the Child's ability to turn eyes to the direction of hand movement. At about 2-3 months, the child begins to gaze more on human face more than objects. Such child smiles at the caregivers, showing that the child does not only know how others feel but also tries to align their own emotions with that of others. At 5 months a child can show empathy and always seeks for harmony between his thought and others, for instance a breast-feeding 5months old child tend to look into the mother's eyes during breastfeeding and identify the mothers' emotions. The child gets terrified and cry if the mother frowns and vice-versa. These are believed to be indices of the trajectory of the eventual ToM as it is measured by 4 year in other studies. So, to an average African, ToM is innate and its development can be evaluated at all ages, beginning from automatic-implicit-personalised ToM, which involves knowledge of own thoughts and progressing to understanding of others' thoughts (Apperly & Butterfill, 2009, Frith & Frith, 2008; Meinhardt-Injac, Daum, Meinhardt, & Persike, 2018).

The Theory of Mind and Mind Blindness in ASDs

ASDs include a range of neuro-developmental disorders typified in impairments in social interaction and communication and by restricted, repetitive, and stereotyped patterns of behaviour (Centers for Disease Control and Prevention, 2012). Kikuchi, Senju, Hasegawa, Tojo, and Osanai (2013) investigated the processing of facial expressions in children with ASD using low spatial frequency images with blurred facial features and high spatial frequency images with rich facial features. Their results suggested that children with ASD are biased toward processing facial expression based on local information. Most often, people with ASD have other sensory deviations in forms of hyper sensibility or hypoesthesia, but the mechanism is not yet clear (Toyomaki & Murohashi, 2013). ASD is symptomised in three major deficits including, impairments in socialization;- communication deficits and repetitive behaviours or interest (American Psychiatry Association (APA), 2013; Barendse, Hendriks, Thoonen, Aldenkamp & Kessels, 2018). Socialisation impairments may manifest in preference for being alone, a lack of social interaction and gaze shifting, as well as avoidance of eye contact (Golarai, Grill-Spector, & Reiss, 2006; Senju & Johnson, 2009) while communication deficits in ASD include poor imitation of others, poor or no speech and gestures.

Growing research suggests that ASD is an abnormality of the theory of mind (Benarous, Guilé, Consoli, & Cohen, 2015; Baro-Cohen, 1997; 2001; Hill & Frith, 2003; O'Brien, Slaughter, & Peterson, 2011). Baron-Cohen (1985; 2001) found ToM deficiency as a core cognitive feature of the autism spectrum conditions. ToM is the ability to make inferences about one's own and other people's mental states (Baron-Cohen, Leslie, & Frith, 1985). Theory of Mind (ToM) is the ability to make inferences about one's own and other people's mental states (Baron-Cohen, Leslie, & Frith, 1985). ToM is perceived to have global applicability that enables one to predict other people's mental states such as beliefs, desires, emotions, intentions and knowledge (Premack & Woodruff, 1978). The ability

to make inferences is with the understanding of the subjective nature of both one's own and others' mental states. Premack and Woodruff (1978) defined ToM as strategies for ascribing mental states to others; and to oneself as well as a shorthand for understanding and attributing other people's mental state. ToM has also been used synonymously with mindreading or mentalising (Baron-Cohen, 1997; 2001). Thus, with ToM, human faces may give signals about identity, gender, age, physical health, emotion, and intentions of oneself and others (Jack & Schyns, 2015). Advanced abilities related to ToM include the comprehension and use of metaphor and irony, distinguishing jokes from lies in false belief and 'faux pas' situations (Brooks, & Meltzoff, 2015; Southgate, Chevallier, & Csibra, 2010). Strong ToM aids children to form impressions that not all presentations are true (Mathersul, McDonald, & Rushby, 2013; Peterson, Wellman, & Slaughter, 2012).

The trajectory of ToM has been variously explained by authors (Baron-Cohen, 1995; Brooks, & Meltzoff, 2015; Dunbar, 1998; Scholl & Leslie, 1999; Wellman, 1990). Baron-Cohen, (1995) proposes that children can become competent analysts of mental states even though they cannot touch, see, or hear them, thus there must be some innate ability that allows ToM to develop. That innate ability Baron-Cohen refers to as "neural module" which he argues, is the information processing unit that takes lower order inputs and transforms them into higher level outputs. These neural modules are specific and automatic in information processing (Scholl & Leslie, 1999). According to this viewpoint, the development of ToM is based on neurological maturation of the brain structures involved, rather than environmental factors like language or social circuit. In Baron-Cohen's view, the theory of mind is universal and consistent across cultures (Baron-Cohen, 1997; 2001; Brook & Meltzoff, 2015).

In the premise of proposed interconnectivity of ToM and ASD, Baron-Cohen developed an explanatory model of ASD called the mind-blindness theory of ASD (Baron-Cohen, 1997). The theory holds that ASD arises when an individual is unable to visualise people's thoughts and beliefs from their physical dispositions (mind-blindness). Thus, a number of studies have used different ToM tests to assess impairments in ASD (e.g. Kimhi, 2014; Brewer, Young, & Barnett, 2017; Sodian, Schuwerk, & Kristen, 2015). Baron-Cohen, (1997) postulated a ToM model of ASDs (including autism and Asperger's syndrome) called the "Mind-Blindness Theory" (MBT) of ASD. Baron-Cohen believed that children with autism and Asperger's syndrome have delayed ToM development and so have 'Mind-Blindness' (MB). He conceptualised MB as a state of finding other people's behaviour confusing, unpredictable and frightening. Mind-blindness theory is anchored on the ASD patients' inability to read the mind of others. On this premise of MBT, Baron-Cohen, put forward, six major propositions explaining phenotypical manifestation of ASD in diverse ages:

- i) *Compared to typically developing, a 14 months, child with ASDs show reduced frequency of joint attention (such as pointing or following another person's gaze), making them unable to look at another person's face and eyes, or pay attention to other persons' interest;*
- ii) *unlike the typically developing children at 24-month-old, children with ASD cannot use mindreading skills to understand the other person's mind in a pretence play.*
- iii) *children with autism and Asperger's syndrome are delayed in passing the "seeing leads to knowing" tests meaning, they lack understanding that merely touching a box is not enough to know what is inside.*
- iv) *a four-year-old Autistic child fails the 'false belief' test' of, recognising when someone else has a mistaken belief about the world while typically developing child passes the test.*
- v) *Children with autism and Asperger's syndrome tend to assume everyone is telling the truth, and may be shocked by the idea that other people may not say what they mean.*
- vi) *Further, the theory holds that at 9 years children with ASD are delayed by around three years in faux pas skills (ability to detect what could hurt others) (Baron-Cohen, 1997:59).*

Based on these theoretical principles, Baron-Cohen concluded that individuals with ASD are mind-blind. That is to say, they are unable to visualise peoples' thoughts and beliefs from their physical dispositions. Baron-Cohen therefore, theorised that Mind-blindness accounts for the social and communication difficulties among ASD across contexts. However, a major gap in the literature is how this theory could inform screening, diagnosis, and intervention in the African socio-cultural context.

African Perspectives of ASD

The community's acceptance and perception of certain behaviours is determined by culture and philosophy of existence (Leshota & Sefotho, 2018); therefore, it can be difficult to explain or proffer interventions against problematic and stereotypical behaviour considering the cultural and social background of the population (Bölte & Richman, 2019). African perspectives generally do not make distinctions regarding types of mental disabilities and neurodevelopmental needs. Among the Basotho of Lesotho, a person with any mental disability is described as 'sehole' one whose mind in some way has been affected and is functioning below par (Khotso, 2017). Culture and religion tend to stereotype and stigmatize people with ASD and other disabilities in Africa (Baffoe, 2013; Bakare, et al., 2009). African countries are known for holding tenaciously their cultural heritage and value systems that define

their communal existence. Given the collectivist African cultures, their beliefs, values and approaches are governed by those of their land irrespective of globalisation and all the western dilution. Physical and mental diseases in major African communities are thought to originate from external causes ranging from “breach of a taboo or customs, disturbances in social relations, such as marriage between a close relatives (Leshota, 2011; Ivan, 2017), hostile ancestral spirits, spirit possession, demoniacal possession, evil machination and infringement of objects, witchcraft, natural affliction by God or gods (Bankole, 2016; Ebede-Ndi, 2016; Groce, & Mont, 2013).

For instance, Aguwa (1995) noted that in a community in Nigeria, ASDs are believed to be a product of supernatural and spiritual punishment and shame for the parents. In another community in Nigeria, the likes of ASD are regarded as ‘*agwu*’ meaning possessed of the ancestral demons / deity to plague the parents for their sins. In some African communities, it is believed that a woman only gives birth to such babies when the gods are annoyed. In South Africa, persons with ASD as other disabled persons are seen as people of undesirable character; of lower category; and as half-humans (Leshota & Sefotho, 2018). Avoke (2002) found that derogatory labels and hurtful handling were given to people with disabilities in many communities in Ghana. This was also the case of Cameroon (Klibi, 2016; Rohwerder, 2018) and so many families with autistic children in Cameroon locked the children in bedrooms, because they are seen as disgrace to the family. Other African countries, such as Ethiopia, Senegal, Uganda and Zambia believe in supernatural (demons/spirits) causes of autism and other disabilities (Groce & McGeown, 2013 Mostert, 2016, Aley, 2016).

Chukwueloka (2016) found that societies hold negative stereotypes, and prejudices against the autistic children in Africa. Such beliefs influence societal attitudes towards people with disabilities in general and autistic individuals in particular. These community negative attitude, rejection and stigma against both the child and the parents (Klibi, 2016; Rohwerder, 2018), especially the mother affect how parents and caregivers raise their concerns and seek help about ASD. African study (Burns & Tomita, 2015) show that 50% of individuals seeking help for mental health concerns first consult traditional and religious healers. In most cases, the family seeking help from spiritual angle indicates that even in their mind, they are also confused about what brought such unwholesomeness their way. They tend to resort to traditional rituals in a bid to appease the gods, or run into religious organisations where they can be accepted and prayed for (Abbey, 2018; Burns, 2015). Consequently, the children become enmeshed with all kinds of comorbid conditions which reduce their functionality (Bakare & Munir, 2011; Mankoski, et al, 2006; Mpaka, et al., 2016; Ruparelia, et al., 2016).

Though ASDs signs and symptoms are not conspicuous at birth, it is possible for parents and caregivers to notice behavioural difficulties associated ToM at early stage (Catalano, Holloway, & Mpofo, 2018; Nordahl-Hansen, Hart, & Øien, 2018). Karst and Van Heke, (2012) noted that parent and family of children with emerging ASDs get concerned about the condition long before diagnosis is confirmed. Cultural values dictate the ways African children are socialized (Idang, 2015; Serpell, & Adamson-Holley, 2017), and behavior milestone on which parents and health practitioners may anchor their observation and screening about the child’s behaviour deviations and ToM disabilities. Thus the parents’ concerns about the behaviour of the child should be drawn from cultural basis of age appropriate behaviours.

Furthermore, in spite of the increasing prevalence of ASD in Africa (Bakare & Munir, 2011; Lagunju et al., 2014; Chinawa et al., 2016), integrating routine developmental monitoring in maternal and child health care has encountered challenges in African countries (Marlow, et al., 2019). The quandary of victims in remote villages in Africa is goaded by the inadequate knowledge about age-appropriate developmental milestones and early warning signs, among both parents and community health workers who are mostly accessible to families. We drew from Baron-Cohen’s work to suggest a culturally-based mind-blindness paradigm for parents’ screening of their children’s ASD early in the first year of life.

A Paradigm for Autism Spectrum Disorder in Africa

From the preceding discussions, we have established that ToM deficit is a definitive feature of ASD across cultures. We also found that though ToM is an innate ability, it is developed over time by culturally-based social experiences. We also understood that ToM development proceeds from implicit to explicit dimensions. From the lens of Baron-Cohen’s theory of mind blindness, ASD could be typified in diverse ages by delay in development of age-appropriate ToM (mindblindness). We argue that though the theory addressed ToM as a universal concept, it failed to capture the African communal existence and worldview in the proposition. For instance, as discussed in the earlier parts of this article, Africans epistemic and ontological approach differs significantly from those of the Western worldview (Ebede-Ndi, 2016). African believe that spirit permeates all things and the connectedness of human and spiritual networks.

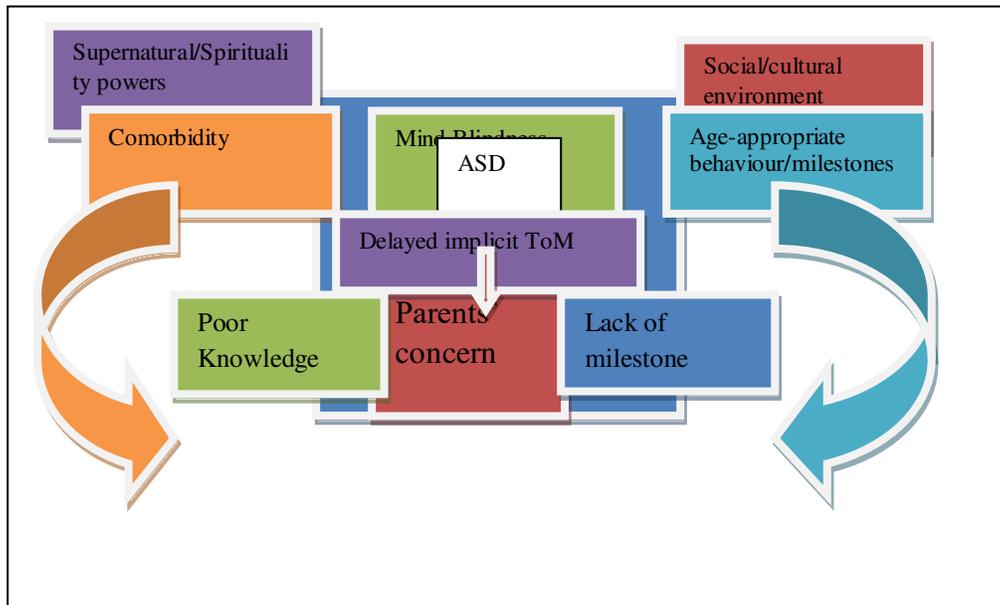


FIGURE 1. Schematic representation of ASD within mind blindness theory in African context.

The theory also failed to capture differences in cultural perspective concerning both ToM and ASD development that could limit parents from screening their children for early diagnosis. Another critical area which Baron-Cohen’s theory is at variant with African perspective is that the theory captured only explicit ToM which underlies the ability to ascribe predict the behaviour of others, and ignored the implicit system which is found in children (Apperly & Butterfill, 2009).

Using a reconstructionist approach, we further expand the conceptualization of ToM and the mind blindness theory to address African cultural and social experiences. We extended research by pointing out interrelatedness of such socio-cultural variables (such as belief in human and spiritual interrelatedness, values and language, etc), with the ToM and ASD. We argue that socio-cultural factors could alter the rate at which implicit ToM in children is unravelled. We outlined integrated ideas concerning mind-related disorders (ASD inclusive) in a framework for autism research in Africa by baring the emerging socially based African perspectives, such as spirituality; socio-cultural factors (eg. collectivism, stigma, language, etc); high level of comorbidity; poor knowledge and lack of culturally based milestones for parental screening and surveillance (Figure 1). The centre of the model is a square of three layers, with ASD at the innermost, and then MB and ToM, showing that in an ASD condition, MB covers the space between autistic child and ToM abilities. This establishes that in Africa; ASD patients lack ToM, a condition referred to as MB. However, other variables also contribute to the explanatory framework, emerging from African perspectives.

First, Africans believe in spirituality (Figure 1) in mind-related abilities and disabilities. In most African communities, ToM deficit in individuals with ASD is believed to be a spiritual issue manifesting as dissonance between spiritual and material human existence. This underlie their belief in ASD as “breach of a taboo or customs, disturbance in social relations, hostile ancestral spirits, spirit possession, demoniacal possession, evil machination and infringement of objects, witchcraft (Bankole: 2016: Burns & Tomita, 2015 ; Ebede-Ndi, 2016: Groce, & Mont, 2013; Gona, et al, 2015; Klibi, 2016), which are generally the case of most African communities including Nigeria (Aguwa, 1995), Cameroon (Klibi, 2016; Rohwerder, 2018), South Africa (Khotso, 2017; Leshota, 2011) and other African countries and local communities (Groce et al., 2013; Mostert, 2016). The beliefs in supernatural powers tend to limit how parents set out to observe the child in African, even when available cultural lenses are adequate for early notice of aberration (Burns, & Tomita, 2015). Such beliefs tend to veil ASD conditions by the parents or primary caregivers who are supposed to raise concern are busy attributing the condition to witchcraft/spiritual attacks. Consequently, most affected families tend to resign to fate when it comes to ASD at-risk.

We argue that such believes are erroneous and unhelpful in the ASD screening, diagnosis and management. Drawing from Baron-Cohen and Hammer (1997), neural processes, which are genetic underlie ToM deficit in ASD, but can improve significantly through management and intervention. Current findings suggest that with appropriate intervention and supports, ASD children can grow up to live normal independent lives like the non autistic population (Sally, Ozonoff & Hansen, 2013). If this is implicated, ASD should be reconceptualised in different

African communities as an ill-health which calls for parental surveillance and intervention. However, this could also pose some limitations, given the characteristic comorbidities prevalent in African cases.

Secondly, high comorbidity is another distinguishing factor in African contexts. It suffices to say that ASDs normally co occur with other physiological/biomedical co morbid illnesses, but the cases of African communities are different, characterised by high level of comorbidities of threatening illnesses which in most cases precede the emergence of ASD symptoms (Bakare et al., 2011). African studies have consistently found 'a higher than normal' comorbidities, ranging intellectual disability (ID), severe speech delay, epilepsy, chronic malaria and overall non functionality (Bakare et al., 2011; Mankoski, et al., 2006; Mpaka, et al., 2016; Ruparelia, et al., 2016). These comorbid conditions could interfere with and/or limit parents' surveillance for ASD, given that the comorbid biomedical conditions tend to take priority leaving the social deficit of the child unnoticed at the onset. As a result the tendencies for complications are raised, threatening the functionality if the children with ASD at the long run.

Thirdly, African Social/cultural environment is important for ToM development and ASD inferences. The social/ cultural factors such as language, gestures and body movement, playing toys, values, norms and religion tend to contribute to how ToM can be inferred from children's behaviour based on expected behaviour for a given age (see the figure) (Brook & Meltzoff, 2015; Meltzoff, & Gopnik, 2013; Milligan, Astington, & Dack, 2007). Studies have shown that when tested with western measures of ToM, African adults perform below ceiling level compared to those with western origin (Lazarus, 2009; Mc Grath, 2009). Such difference does not depict that such adults actually lack ToM abilities, (since ToM in itself is universal across cultures) but the measures are culturally biased (Lazarus, 2009; Mc Grath, 2009). While African worldview support the development of sound mind, and the innate nature of the mind, some of their cultural practices could limit early identification ASD based on ToM abilities (Wilford, 2013). This could explain why comorbidity is high in African countries leading to totally non-functionality in ASD individuals (Bakare et al., 2011; Mankoski, et al., 2006; Mpaka, et al., 2016; Ruparelia, et al., 2016).

The culture dictates which behaviour is right or wrong for a given age of the child. Hence African child may need to be viewed from the basis of culturally age-appropriate behaviour expectation to pass ToM tests (Idang, 2015; Serpell, & Adamson-Holley, 2017). We found from the literature that infants and toddlers draw from unspoken/implicit ToM processes to explicate the actions and behaviors of others. Upon this implicit system lies the more class understanding of the physical and social worlds in the progress of development. Infants also are enthusiastic (indicating joint attention) in learning social and communicative clues from other people and through this, learn culturally transmitted knowledge such as language, gestures, measurements and emotions. Infants' communication is not based on language rather through signals they respond adults' intentions (such as eye contact, songs rhythms and infant-directed speech) (Csibra, 2010).

Furthermore, delayed implicit theory of mind (see figure 1) is now an account of the innate predisposition for mind blindness, spiritual, social and cultural factors through a pathway of the child progress in learning culturally-based social cues. The parents being the closest person and the core agent of socialisation are expected to detect any anomaly during child interactions in social or communicative milieu. Because infants are not developed in verbal language, it is always difficult and hazy to make proposition about how their minds are expressed. Nevertheless, a major claim in this study is that ToM is observable in infant quite before their verbal age, especially as it is observable by cultural norms (Brook & Meltzoff, 2015 Meltzoff, & Gopnik, 2013). Africans believe that minds are inherent in children at birth, and depend on environmental activation to develop to adult sound mind. Given this assumption, assessing attributes associated with the mind can be done at any age of the child. Based on this insight, we argue that indices of normal development in the mind can be accessed at as early as 5 months by parents/carer, though may not be noticed in a formal setting. Implicit processes are developmental milestones for ToM at early stage (age 5-14 months) (Apperly & Butterfill, 2009; National Research Council, 2015).

African perspective also strongly subscribes to the fact that infant learn and express cognitive and social skills from birth, beginning from spontaneous/ automatic processes to more refined ones. This is based on African socio-cultural standpoints that are scientifically verifiable, on which we anchor the African framework. Example, Lombardo and Baron-Cohen (2011) argued that for a child to infer other's behaviour, the child first learns to understand the "self" and use self as a basis for matching and making inferences about other's behaviours. The African situation is that most parents may notice aberration, but due to poor knowledge of ASD and fear of stigma (Catalano, et al., 2018; Nordahl-Hansen, et al., 2018). Thus even though they may suspect deviations (Karst et al., 2012), they are not likely to proceed to go for diagnosis.

At 5 months, children turn out to be perceptive, learn to trust or not and validate peoples' emotion before allowing one to carry him. Strengthening this, Spelke and Kinzler, (2009) showed that during the first year, an infant understands others' minds in terms of concepts, goals and perceptions. Looking/eye gazing and gaze shifting are paramount for all the above in children at this stage for social skill. Further, facial expressions are also culturally bound and the child's understanding of facial expression depends on cultural experiences and learning. Since

infants' ToM abilities are expressed through intuitive, spontaneous and automatic processing of both cognitive and social cues (National Research Council, 2015), early in their first year (5-14 months), we propose that given culturally-based measures of milestones, parents and carers can monitor child's success in milestones to identify children at-risk. ability to listen with shared attention to songs; Gazing at human faces more than object; smiling and laughing with moving virtual objects and to caregivers; interest in others' emotions such as respond to mothers' by crying and or laughing as the case may be. Literature has shown that all these are measurable, provided appropriate measures are developed (Billargeon, Scott & He, 2010; Herlihy, Knoch, Vibert, & Fein, 2015; Southgate, et al., 2010).

We presume from the above, that ToM can be measured in infants of 5-14 months using informal socio-cultural prompt tests by caregivers. Hence, mind-blindness model can be extended to incorporate infants within that age range so that early measures can be taken to ameliorate the extreme comorbid conditions of ASD in Africa due to late diagnosis. Further studies should attempt to develop measurement tests for ToM/mindblindness in line with this framework for ASD surveillance in different ethnic groups of African cultural backgrounds. Contextualised age-specific ToM developmental milestones in children that can be used to measure ASD in toddlers (see figure 1) is a priority for African research and practice in ASD.

CONCLUSION AND IMPLICATIONS

This article sought to contribute to the literature in the following ways. *Firstly*, the article contributes through applying mind-blindness, a ToM theory of ASD to African socio-cultural perspectives. This was meant to offer useful understanding of the extent to which the theory captures African perspectives in its propositions. Conceptual scrutiny showed that mind-blindness theory needs extension of the stated milestones for it to fully take care of language and other cultural differences such as values and behaviour standards in African cultures. *Secondly*, we projected a possible culturally-based framework for informal ASD screening by parents and day-care teachers. Since policy outline and implementations are common problems in African countries, community awareness based on improving parent knowledge of ASD and its risk factors are essence, through community services, anti-natal and post-natal visits. *Thirdly*, we suggested an extension of Mind blindness theory to age 5-14 months for African socio-cultural diversity. This will help offer a guideline for parents to monitor their infants for ASD beginning from birth.

We recommend further studies to develop culturally-based ToM milestones for infant and carry out a longitudinal research on the children whose parents raise concern about those ToM attributes between 5-14 to find out the link between parent's concern and being diagnosed of ASD by 3-4 years. Also culturally-based tests in line with MBT should be developed for use in diverse cultural backgrounds in Africa. ASD awareness efforts in African should involve educating parents and day-care teachers of the early indicators of ASD for early screening.

Acknowledgements

Both researchers were involved in the inquiry and writing of this article. The Researchers wish to thank the research assistants and the participants. The statistical analyst is also appreciated.

References

- Abubakar, A., Ssewanyana, D., & Newton, C. R. (2016). A systematic review of research on autism spectrum disorders in Sub-Saharan Africa. *Behavioural neurology*, 2016. doi:10.1155/2016/3501910
- Aguwa, J. C. U. (1995). *A study of the patron spirit of divination and medicine in an African Society*. Fourth dimension publishing Company, Nigeria.
- Akhter, S., Hussain, A. E., Shefa, J., Kundu, G. K., Rahman, F., & Biswas, A. (2018). Prevalence of Autism Spectrum Disorder (ASD) among the children aged 18-36 months in a rural community of Bangladesh: A cross sectional study. *F1000 Research*, 7. doi: 10.12688/f1000research.13563.1
- American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders. *BMC Med*, 17, 133-137.
- Apperly, I. A., & Butterfill, S. A. (2009). Do humans have two systems to track beliefs and belief-like states?. *Psychological review*, 116(4), 953.
- Audu, V.E.I. & Egbochuko, E.O. (2010). Autism among primary school pupils in Benin Metropolis: implications for counselling. *Edo Journal of counselling*. 3(2). 261- 272. Retrieved from <http://www.ajol.info/index.php/ejc/article/viewFile/63612/51446>
- Avoke, M. (2002). Models of disability in the labelling and attitudinal discourse in Ghana. *Disability & Society*, 17(7), 769-777.
- Baffoe, M. (2013). Stigma, Discrimination & Marginalization: Gateways to Oppression of Persons with Disabilities in Ghana, West Africa. *Journal of Educational & Social Research*. 3(1), 187-198. doi: 10.5901/jesr.2013.v3n1p187

- Baillargeon, R., Scott, R. M., & He, Z. (2010). False-belief understanding in infants. *Trends in cognitive sciences*, 14(3), 110-118. doi: 10.1016/j.tics.2009.12.006.
- Bakare, M. O., & Munir, K. M. (2011b). Autism spectrum disorders (ASD) in Africa: a perspective. *African journal of psychiatry*, 14(3), 208-210. doi:10.4314/ajpsy.v
- Bakare, M. O., Agomoh, A. O., Ebigbo, P. O., Eaton, J., Okonkwo, K. O., Onwukwe, J. U., & Onyeama, G. M. (2009). Etiological explanation, treatability and preventability of childhood autism: a survey of Nigerian healthcare workers' opinion. *Annals of General Psychiatry*, 8(1), 6.
- Bakare, M. O., Ebigbo, P. O., Agomoh, A. O., & Menkiti, N. C. (2008). Knowledge about childhood autism among health workers (KCAHW) questionnaire: description, reliability and internal consistency. *Clinical practice and epidemiology in mental health*, 4(1), 17. doi:10.1186/179-4-17
- Bakare, M. O., Ebigbo, P. O., Agomoh, A. O., Eaton, J., Onyeama, G. M., Okonkwo, K. O., ... & Aguocha, C. M. (2009). Knowledge about childhood autism and opinion among healthcare workers on availability of facilities and law caring for the needs and rights of children with childhood autism and other developmental disorders in Nigeria. *BMC pediatrics*, 9(1), 12. doi: 10.1186/1471-2431-9-12.
- Bankole, O. (2016). Involving African families in the education of their autistic children. *Network Autism*.
- Barendse, E. M., Hendriks, M. P., Thoonen, G., Aldenkamp, A. P., & Kessels, R. P. (2018). Social behaviour and social cognition in high-functioning adolescents with autism spectrum disorder (ASD): two sides of the same coin?. *Cognitive processing*, 19(4), 545-555. doi 10.1007%2Fs10339-018-0866-5
- Baron-Cohen S. (2001). Theory of mind and autism: A review. *International Review of Research in Mental Retardation: Autism*. 23:169–184.
- Baron-Cohen, S. (1995). *Mindblindness: an essay on autism and theory of mind.*: MIT Press/Bradford Books.
- Baron-Cohen, S. (1997). *Mindblindness: An essay on autism and theory of mind.* MIT press.
- Baron-Cohen, S. (2008). Theories of the autistic mind. *The Psychologist*.
- Baron-Cohen, S., Campbell, R., Karmiloff-Smith, A., Grant, J., & Walker, J. (1995). Are children with autism blind to the mentalistic significance of the eyes?. *British Journal of Developmental Psychology*, 13(4), 379-398. doi:10.1111/j.2044-835X.1995.tb00687.x
- Baron-Cohen, S., Leslie, A. M., & Frith, U. (1985). Does the autistic child have a "theory of mind"?. *Cognition*, 21(1), 37-46
- Benarous, X., Guilé, J. M., Consoli, A., & Cohen, D. (2015). A systematic review of the evidence for impaired cognitive theory of mind in maltreated children. *Frontiers in psychiatry*, 6, 108. doi:0.3389/fpsy.2015.00108
- Bölte S. & Richman, K. A. (2019). Hard talk: Does autism need philosophy? *Autism*, 23 (1), 3-7.
- Brewer, N., Young, R. L., & Barnett, E. (2017). Measuring theory of mind in adults with autism spectrum disorder. *Journal of autism and developmental disorders*, 47(7), 1927-1941. doi: 10.1007/s10803-017-3080-x
- Brooks, R., & Meltzoff, A. N. (2015). Connecting the dots from infancy to childhood: A longitudinal study connecting gaze following, language, and explicit theory of mind. *Journal of Experimental Child Psychology*, 130, 67-78. doi: 10.1016/j.jecp.2014.09.010
- Burns, J. K. (2015). Why searching for psychosis in diverse settings is important for global research and mental health systems development. *Social psychiatry and psychiatric epidemiology*, 50(6), 895-897.
- Burns, J. K., & Tomita, A. (2015). Traditional and religious healers in the pathway to care for people with mental disorders in Africa: a systematic review and meta-analysis. *Social psychiatry and psychiatric epidemiology*, 50(6), 867-877. doi: 10.1007/s00127-014-0989-7
- Catalano, D., Holloway, L., & Mpofu, E. (2018). Mental health interventions for parent carers of children with autistic spectrum disorder: Practice guidelines from a Critical Interpretive Synthesis (CIS) systematic review. *International journal of environmental research and public health*, 15(2), 341. doi:10.3390/ijerph15020341
- Centers for Disease Control and Prevention (2012). Prevalence of autism spectrum disorders: *Autism and developmental disabilities monitoring network*, 14 sites, United States, 2008. *MMWR Surveillance Summaries*, 61, 1–19.
- Chinawa JM, Manyike PC, Aniwada EC, Chinawa AT, Obu HA, Odetunde OI, Nwokocha AR, Ibekwe R (2016). Prevalence and socioeconomic correlates of autism among children attending primary and secondary schools in south east Nigeria. *African Health Sciences*; 16(4). doi :10.4314/ahs.v16i4.8
- Chukwueloka, V. N. (2016). Attitudes of Nigerian Mothers Toward Children With Autism Spectrum Disorder. Walden Dissertations and Doctoral Studies
- Chumbow, B. S. (2009). Linguistic diversity, pluralism and national development in Africa. *Africa Development*, 34(2).
- Csibra, G. (2010). Recognizing communicative intentions in infancy. *Mind & Language*, 25(2), 141-168.
- Dixon, P., Badoe, E. V., & Owusu, N. A. V. (2015). Family perspectives of autism spectrum disorders in urban Ghana. *Journal of the International Child Neurology Association*. doi 10.17724/JICNA.2015.107
- Dunbar, R. (1998). Theory of mind and the evolution of language. *Approaches to the Evolution of Language*, 92-110.

- Ebede-Ndi, A. (2016). A critical analysis of African-centered psychology: From ism to praxis. *International Journal of Transpersonal Studies*, 35(1), 9. doi. 10.24972/ijts.2016.35.1.65
- Enserink, B., Patel, M., Kranz, N., & Maestu, J. (2007). Cultural factors as co-determinants of participation in river basin management. *Ecology and Society*, 12(2), 24.
- Golarai, G., Grill-Spector, K., & Reiss, A. L. (2006). Autism and the development of face processing. *Clinical neuroscience research*, 6(3-4), 145-160. doi: [10.1016/j.cnr.2006.08.001](https://doi.org/10.1016/j.cnr.2006.08.001)
- Gona, J. K., Newton, C. R., Rimba, K., Mapenzi, R., Kihara, M., Van de Vijver, F. J., & Abubakar, A. (2015). Parents' and professionals' perceptions on causes and treatment options for autism spectrum disorders (ASD) in a multicultural context on the Kenyan coast. *PloS one*, 10(8), e0132729. doi:10.1371/journal.pone.0132729
- Groce, N., & McGeown, J. (2013). Witchcraft, Wealth and Disability: Reinterpretation of a folk belief in contemporary urban Africa. *Leonard Cheshire Disability and Inclusive Development Centre Working Paper Series*, (30), UCL. <https://www.ucl.ac.uk/iehc/research/epidemiologypublic-health/research/leonard-cheshire-research/research/publications/documents/workingpapers/wp-30.pdf>
- Herlihy, L. Knoch, K. Vibert, B. & Fein, D. (2015). Parents' first concerns about toddlers with autism spectrum disorder: Effect of sibling status. *Autism*, 19(1): 20–28. doi:10.1177/1362361313509731.
- Hill, E. L., & Frith, U. (2003). Understanding autism: insights from mind and brain. *Philosophical Transactions of the Royal Society of London. Series B: Biological Sciences*, 358(1430), 281-289.
- Horton Jr., A.M., Carrington, C.H., & Lewis-Jack, O. (2001). *Handbook of multicultural assessment: clinical, psychological, and educational applications*. Chapter 5 –Neuropsychological Assessment in a Multicultural Context. San Francisco : Jossey-Bass
- Idang, G. E. (2015). African culture and values. *Phronimon*, 16(2), 97-111.
- Idemudia, E. S. (2015). Psychology in Africa or African Psychology? Discourse on paradigm shift in psychotherapy and psychological practice in Africa. *World*, 1(8).
- Idemudia, E.S. (2004) Mental Health and Psychotherapy through the eyes of culture:LessonsforAfricanPsychotherapy In S.E.Idemudia (Eds) Culture, Psychosocial disorder and Mental Health: An African perspective-The Unifying aspects of Cultures. Trans-Studien zur veränderung der welt Bd. 1Vienna, Austria.
- Idemudia, E.S. (2013). Universalizing Psychology: The Voyage of an African psychologist. An Inaugural Lecture, Held in G106 (CLB 260), on the 17th October, 2013, NorthWest University (Mafikeng Campus), South Africa.
- Jack, R. E., & Schyns, P. G. (2015). The human face as a dynamic tool for social communication. *Current Biology*, 25(14), R621-R634. doi:10.1016/j.cub.2015.05.052
- Kikuchi, Y., Senju, A., Hasegawa, T., Tojo, Y., & Osanai, H. (2013).The effect of spatial frequency and face inversion on facial expression processing in children with autism spectrum disorder. *Japanese Psychological Research*, 55, 118–130. doi: 10.1111/jpr.12000
- Kimhi, Y. (2014). Theory of mind abilities and deficits in autism spectrum disorders. *Topics in Language Disorders*, 34(4), 329-343. doi: 10.1097/TLD.0000000000000033
- Klibi, A. R. (2016). Autism in Cameroon: A witchcraft curse. <https://www.icare4autism.org/autism-in-cameroon>
- Lagunju, I. A., Bella-Awusah, T. T., & Omigbodun, O. O. (2014). Autistic disorder in Nigeria: profile and challenges to management. *Epilepsy & Behavior*, 39, 126-129. doi:10.1016/j.yebeh.2014.08.020
- Lazarus, A. (2009). Assessing the impact of culture on Theory of Mind performance in South African Adults. *Unpublished honours thesis*. University of Cape Town, Rondebosch, South Africa.
- Leshota, P. L. & Sefotho, M. M. (2018). *Philosophy of disability: African perspectives*. In Philosophy in Education and research: African perspectives. Van Schaik Publishers, Pretoria, South Africa.
- Lombardo, M. V., & Baron-Cohen, S. (2011). The role of the self in mindblindness in autism. *Consciousness and cognition*, 20(1), 130-140. doi:10.1016/j.concog.2010.09.006
- Makhubela, M. (2016). From psychology in Africa to African psychology: Going nowhere slowly. *Psychology in Society (PINS)*, 52, 1–18. doi 10.17159/2309-8708/2016/n52a1
- Mankoski, R. E., Collins, M., Ndosi, N. K., Mgalla, E. H., Sarwatt, V. V., & Folstein, S. E. (2006). Etiologies of autism in a case-series from Tanzania. *Journal of Autism and Developmental Disorders*, 36(8), 1039.
- Marlow, M., Servili, C., & Tomlinson, M. (2019). A review of screening tools for the identification of autism spectrum disorders and developmental delay in infants and young children: recommendations for use in low-and middle-income countries. *Autism Research*, 12(2), 176-199. doi.10.1002/aur.2033
- Mathersul, D., McDonald, S., & Rushby, J. A. (2013). Understanding advanced theory of mind and empathy in high-functioning adults with autism spectrum disorder. *Journal of clinical and experimental neuropsychology*, 35(6), 655-668. doi.10.1080/13803395.2013.809700
- Matoane, M. (2012). Locating context in counselling: The development of indigenous psychology in South Africa. *Psychotherapy and Politics International*, 10(2), 105-115. doi.10.1002/ppi.1263

- Mc Grath, M. (2009). Assessing the effect of culture on theory of mind performance in South African students. *Unpublished honours thesis*. University of Cape Town, Rondebosch, South Africa.
- Meinhardt-Injac, B., Boutet, I., Persike, M., Meinhardt, G., & Imhof, M. (2017). From development to aging: holistic face perception in children, younger and older adults. *Cognition*, 158, 134-146.
- Meltzoff, A. N., & Gopnik, A. (2013). Learning about the mind from evidence: Children's development of intuitive theories of perception and personality. In S. Baron-Cohen, H. Tager-Flausber, & M. Lombardo (Eds.), *Understanding other minds* (3rd ed., pp. 19-34). Oxford, England: Oxford University Press.
- Miles, J. H. (2011). Autism spectrum disorders—a genetics review. *Genetics in Medicine*, 13(4), 278.
- Milligan, K. Astington, J. W. & Dack, L. A. (2007). Language and theory of mind: Meta-analysis of the relation between language ability and false-belief understanding. *Child Development*, 78(2):622–646. doi: 10.1111/j.1467-8624.2007.01018.x
- Mostert, M.P. (2016). Stigma as a barrier to the implementation of the Convention on the Rights of Persons with Disabilities in Africa. *African Disability Rights Yearbook*, 2-24. http://www.adry.up.ac.za/images/adry/volume4_2016/adry_2016_4_chapter1.pdf
- Mpaka, D. M., Okitundu, D. L. E. A., Ndjukendi, A. O., N'situ, A. M., Kinsala, S. Y., Mukau, J. E., ... & Steyaert, J. (2016). Prevalence and comorbidities of autism among children referred to the outpatient clinics for neurodevelopmental disorders. *The Pan African Medical Journal*, 25. doi: [10.11604/pamj.2016.25.82.4151](https://doi.org/10.11604/pamj.2016.25.82.4151)
- National Research Council. (2015). *Transforming the workforce for children birth through age 8: A unifying foundation*. National Academies Press.
- Nordahl-Hansen, A., Hart, L., & Øien, R. A. (2018). The scientific study of parents and caregivers of children with ASD: A flourishing field but still work to be done. doi.10.1007/s10803-018-3526-9
- Nwoye, A (2006) Remapping the fabric of the African self: A synoptic theory. *Dialectical Anthropology*, 30, 119-146.
- Nwoye, A (2013b) African psychotherapy, in Runehov, A L C & Oviedo, L (eds) *Encyclopedia of Sciences and Religions*. Berlin: Springer.
- Nwoye, A (2014) African Psychology, Critical Trends, in Teo, T (ed) *Encyclopedia of Critical Psychology*. DOI 10.1007/978-1-4614-5583-7. New York: Springer Science+Business Media.
- Nwoye, A (2015a) What is African Psychology the Psychology of? *Theory & Psychology*, 25(1), 96-116. Nwoye, A (2015b) African psychology and the Africentric paradigm to clinical diagnosis and treatment. *South African Journal of Psychology*, 45(3), 305-317.
- Nwoye, A (2017). A postcolonial theory of African psychology: A reply to Kopano Ratele. *Theory & Psychology*, 1-9. OnLine First. DOI: 10.1177/0959354317700000
- Nwoye, A. (2015). What is African psychology the psychology of?. *Theory & Psychology*, 25(1), 96-116. doi.10.1177/0959354314565116
- O'Brien, K., Slaughter, V., & Peterson, C. C. (2011). Sibling influences on theory of mind development for children with ASD. *Journal of Child Psychology and Psychiatry*, 52(6), 713-719.
- Peterson, C. C., Wellman, H. M., & Slaughter, V. (2012). The mind behind the message: Advancing theory of mind scales for typically developing children, and those with deafness, autism, or Asperger syndrome. *Child development*, 83(2), 469-485. doi: [10.1111/j.1467-8624.2011.01728.x](https://doi.org/10.1111/j.1467-8624.2011.01728.x)
- Peterson, E., & Miller, S. (2012). The eyes test as a measure of individual differences: how much of the variance reflects verbal IQ?. *Frontiers in psychology*, 3, 220. doi.10.3389/fpsyg.2012.00220
- Premack, D., & Woodruff, G. (1978). Does the chimpanzee have a theory of mind?. *Behavioral and brain sciences*, 1(4), 515-526.
- Ruparelia, K., Abubakar, A., Badoe, E., Bakare, M., Visser, K., Chugani, D. C., ... & Skuse, D. (2016). Autism spectrum disorders in Africa: current challenges in identification, assessment, and treatment: a report on the International Child Neurology Association Meeting on ASD in Africa, Ghana, April 3-5, 2014. *Journal of Child Neurology*, 31(8), 1018-1026. doi.10.1177/0883073816635748
- Sajedi, F., Vameghi, R., & Kraskian Mujembari, A. (2014). Prevalence of undetected developmental delays in Iranian children. *Child: care, health and development*, 40(3), 379-388. Doi: 10.1111/cch.12042.
- Sajedi, F., Vameghi, R., & Kraskian Mujembari, A. (2014). Prevalence of undetected developmental delays in Iranian children. *Child: care, health and development*, 40(3), 379-388. doi.10.1111/cch.1204
- Sanua V.D. (1984) Is infantile autism a universal phenomenon? An open question. *International Journal of Social Psychiatry*. 30(3):163–177. doi: 10.1177/002076408403000301.
- Schaafsma, S. M., Pfaff, D. W., Spunt, R. P., & Adolphs, R. (2015). Deconstructing and reconstructing theory of mind. *Trends in cognitive sciences*, 19(2), 65-72. doi: 10.1016/j.tics.2014.11.007
- Scholl, B. J., & Leslie, A. M. (1999). Modularity, development and 'theory of mind'. *Mind & Language*, 14(1), 131-153.

- Schurz, M., & Perner, J. (2015). An evaluation of neurocognitive models of theory of mind. *Frontiers in psychology*, 6, 1610. doi.10.3389/fpsyg.2015.01610
- Senju, A., & Johnson, M. H. (2009). The eye contact effect: mechanisms and development. *Trends in cognitive sciences*, 13(3), 127-134. Doi.10.1016/j.tics.2008.11.009.
- Serpell, R., & Adamson-Holley, D. (2017). African Socialization Values and Nonformal Educational Practices: Child Development, Parental Beliefs, and Educational Innovation in Rural Zambia. *Laboring and Learning*, 19-43. doi.10.1007%2F978-981-287-032-2_22
- Sodian, B., Schuwerk, T., & Kristen, S. (2015). Implicit and spontaneous theory of mind reasoning in autism spectrum disorders. In *Autism Spectrum Disorder-Recent Advances*. IntechOpen.
- Southgate, V., Chevallier, C., & Csibra, G. (2010). Seventeen-month-olds appeal to false beliefs to interpret others' referential communication. *Developmental science*, 13(6), 907-912. doi: 10.1111/j.1467-7687.2009.00946.x.
- Spelke, E. S., & Kinzler, K. D. (2009). Innateness, learning, and rationality. *Child development perspectives*, 3(2), 96-98.
- Toyomaki, A., & Murohashi, H. (2013). "Salience network" dysfunction hypothesis in autism spectrum disorders. *Japanese Psychological Research*, 55, 175-185. doi: 10.1111/jpr.12012
- Wellman, H. M., Cross, D., & Watson, J. (2001). Meta-analysis of theory of mind development: The truth about false belief. *Child Development*, 72, 655-684. doi:10.1111/1467-8624.00304
- Wilford, A. (2013). ASDs in South Africa: Behavioural presentation; culture-fair tools and access to service. *Human Science Research Council*