The Efficacy of the Modified Checklist in Early Screening for Autistic Sudanese Toddlers

Master Degree Research

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July 2008

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أعوذ بالله من الشيطان الرجيم
بسم الله الرحمن الرحيم

إنما إلّهُمُ اللهُ الذِي لا إلّهَ إلّا هُوَ وَسّعَ كُلَّ شَيْءٍ عَلَمَهُ

صدق الله العظيم
سورة طه الآية {98}

عن مالك، عن يزيد بن خصيفة، عن عروة بن الزبير أنه قال: سمعت عائشة زوج
النبي صلى الله عليه وسلم تقول: قال رسول الله صلى الله عليه وسلم: "لا يُصِبُّ المُؤْمِنُ مِنْ
مُصيبٍ حَتَّى الشَّوَكَةُ إلاّ فِي بَأْسِهَ أو كَفَّرَ بِهَا مِنْ خُطَايَاهُ" لا يُدرِي يزيد أبىما قال عروة.

أخرجه مسلم

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1 مالك بن ظال الموصلي - كتاب العين، باب ما جاء في أجر المريض، صفحة 673. تخريج وتعليق محمد فؤاد عبد الباقى 2001- 1421. دار الحديث القاهرة
Dedication

To all those who modeled my way, who touched my heart and gave me strength to move forward to something better, who inspire me to breathe, who encourage me to understand who I am, and who believe in me when no one else does: to my father's soul, my beloved mother, and my dearest daughter.
Many people have contributed to this research in many ways. I wish to thank at least a few. Dr. Gasim Badri, my dean, whom encouraged me with financial and emotional support as well as release time for research. I have benefited from the encouragement, help, advice, guidance and special design touches of Dr. Abeer Abd Al Rahman Khalil, as she helped to revise and edit the research, her insights have been critical to this study. I wish to acknowledge the invaluable help of Ahmed Faroug, whom lent a hand in making my work trouble-free and was kind with his time and prosperous encouragement. In particular, I wish to acknowledge Dr. Mohamed Al Amin AlKhateb; he has facilitated much of my work. A special thank you is expressed to Uz. Yasir Itejane and Dr. Suleiman Ali who offered me a lot of advice and guidance. A special warm expression of gratitude is made to Dr. Ashraf Badri, Dr. Zeinab Shakab and Omyma Arabi for their generous support.

I am also grateful for the support of my mother, her understanding, patience, and assistance with words of assurance and the much-needed words of love. I wish to express my special thanks to my brother whom supported me throughout the writing of this research and to each of my sisters.
Abstract

This study aimed to evaluate the efficacy of the Modified checklist for autism in toddlers (M-CHAT) as a screening tool for autism in Sudanese toddlers aged 18-36 months through identifying emotional and behavioral problems specific to toddlers with autism. It usually becomes apparent before the child reaches age 36 months. Subjects were 200 mothers of toddlers with and without autism. 100 were autistic and the other 100 were non-autistic. Both groups suffered from no other developmental problem. The sample was purposively selected. Mothers of these groups were asked to answer the items in the checklist after it was translated to the mother tongue i.e. "Arabic language". Analysis revealed that the M-CHAT version performed well as a screening tool for autism in toddlers. M-CHAT proved its ability to differentiate between autistic and non-autistic toddlers; its significance was 0.05. Its reliability was found to be through Cronbach's Alpha 0.976. It was found through applying T-Test that there were differences between the two tested groups of toddlers. The inferential statistics showed that there was a difference between both sexes (males and females), with significance 0.05. Difference due to age did not exist between the 2 groups, or within the same group, with sig. = 0.05. Putting in mind that parents are usually the first to notice a problem their toddler encounters, the M-CHAT offers a potential simple and inexpensive method of screening at risk populations of toddlers for autism; that all parents could easily apply, this facilitates early referral to a multi-disciplinary evaluation team for diagnosis. Early screening leads to early intervention and efforts to encourage social adjustment and speech development and make the child able to respond appropriately.
Modified Checklist for Autism in Toddlers - M-CHAT

(To affirm that it can be used by parents to identify the need for further evaluation and referral for children aged 18 to 36 months to detect the skills that are not within the expected range of behavior for their age, as well as to observe the occurrence of behaviors that may indicate autism. The checklist is administered by a trained professional who will determine the presence or absence of these behaviors and provide guidance on the next steps. The test can also be used to monitor the progress of children with autism over time.)
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Chapter One
Introduction
Introduction

Research problem

Autism, or Autistic Spectrum Disorder, is considered a complex lifelong disability that impedes the normal development of the areas that control social interaction and communication skills in the brain, as well as abnormal restricted, repetitive and stereotyped patterns of behavior. It emerges early in life (during the first 3 years) and exhibits a group of seemingly unrelated features and a wide variation of symptom expression and level of severity by individual (Salma, 2007; p. 25). It often remains unrecognized and undiagnosed until or after late preschool age because appropriate tools for routine developmental screening and screening specifically for autism have not been available. Thus, the researcher is seeking after the answers of the following questions:

1. Does “The Modified Checklist for Autism in Toddlers” display great efficacy in early screening of Sudanese autistic toddlers?

2. Are there any differences between autistic toddlers (males & females) when applying the “Modified Checklist for Autism in Toddlers”?

3. Are there any differences due to the age factor (between and within groups)?

Statement of the research objective

The researcher aims to adapt, adjust, and introduce the so-called “Modified Checklist for Autism in Toddlers,” (Diana et. al 1999), to facilitate to join forces and cooperate with parents to early detect symptoms of autism, which leads to early identification of toddlers with autism and enables intensive early intervention during the toddler and preschool years that improves the outcome for most young toddlers with autism (Abstract of Practice parameter: Screening and diagnosis of autism. Neurology 2000, 55: 468-479).
Importance of the research

The topic in hand comes to be important because it is a disorder, which is not well fully known in Sudan. Even health-care providers and professionals in the Sudan have limited means and instruments of screening assessment and evaluation to rule-in or rule-out a child as being autistic or not (Abd Al Razag, 2007; Nazik, 2006: p. 35; Hind, 2004; and A'isha, 2001).

Autism spectrum disorder is one of the most common childhood developmental disabilities. It is found in every country and region of the world, and in families of all racial, ethnic, religious, and economic backgrounds (Wafa, 2004a: p. 49; (NIMH), 2003). Autism is four times more likely to affect males than females (Wafa, 2004a:p. 49; Hind, 2004: p. 28; American Psychiatric Association (APA), 1994; World Health Organization (WHO), 1992).

The diagnosis of autism often is not made until 2-3 years (Safwat, 2006; Charman & Baird 2002; Stone et al., 1999) after symptoms are recognized, primarily because of concerns about labeling or incorrectly diagnosing the child (Abd Al Razag, 2007). Identifying children with autism and initiating intensive, early intervention during the preschool years results in improved outcomes for most young children with autism. Early identification and intervention is also essential to ensure families and caregivers have appropriate access to appropriate services and professional support (Safwat, 2006; and Rice, 1998).

To the best of the researcher’s knowledge, it is the first study in a Sudanese population that examines the possibility of devising a new screening instrument to detect autism and identify toddlers who are at risk for developing autism. Consequently, it is an attempt to adapt a checklist that enables psychologists, health care workers and parents at the first place, to pinpoint the problem(s) the toddler faces since his/her early years of life.
Definition of terms

a- **Modified checklist for autism in toddlers**: M-CHAT is a screening tool for age 18-36 months

b- **Autism Spectrum Disorder (ASD)**: Autism is often referred to as a "spectrum disorder", meaning that the symptoms and characteristics of autism can present themselves in a variety of combinations, ranging from extremely mild to quite severe.

c- **Autism**: a disorder characterized by sustained impairments in reciprocal social interactions, communication deviance, and restricted stereotypical behavioral patterns. According to DSM-IV, abnormal functioning in the above areas must be present by age 3. Its severity ranges between mild and severe.

d- **Screening**: is a brief assessment procedure designed to identify children who should receive more intensive diagnosis or assessment.
Chapter Two

Literature Review
Definition of the concept 'Autism'

The terms "autism" and "autistic" are of the Greek origin, "autos" which means the "self". Kanner chose the term (auto, "self", and ism, "condition") to refer to the child's apparent self-absorption (Carlson, 1999: p. 468). These individuals lived in their own world, isolated from their social environment. They were self-absorbed and had severe social, communication, and behavioral problems (Ibrahim, 2004: p.24; Adil, 2003: p. 175). The concise Oxford Dictionary (1984) definition of autism was “autism is a morbid absorption in fantasy; mental condition especially in children, preventing proper response to environment.”

The first scientist who talked about Autism was Hilar 1906 who named it as Childhood Dementia; Booter in the year 1933 described it as Childhood Schizophrenia (Rogiea, 2001: p. 3). Kanner in 1943 described the syndrome and called it "Early infantile autism" (Wafa, 2004: p. 26; Hind, 2004: p. 14; and Wienecke 2002); relying on the fact that he worked with children who shared a common, pattern of stereotyped repetitive behaviors, lack of eye contact, as well impairment of social interaction (Nazik, 2006: p. 1; Ibrahim, 2004: p. 26; Wafa, 2004: p.26; Michael et al. 1998: pp. 137-138; and Rimland 1964). Kanner observed that these children often demonstrated capabilities that showed that they were not merely slow learners, yet they did not fit the patterns of emotionally or psychologically disturbed i.e. schizophrenic children (Ibrahim, 2004: p.19; Osman 2002: p.87 ; and Jamal & Mona, 1997: p. 285).

“Autism is a developmental disorder” (The National Autistic Society, 2005); a combination of retarded development and peculiar behavior, that is currently defined in terms of triad of impairments (autistic spectrum disorders are characterized by impairments in social interaction, social communication, and imagination, which can occur in varying degrees of severity. This triad is generally accompanied by a limited, narrow, repetitive pattern of activities) in
social interaction, communication, and behavioral flexibility (Ibrahim 2004 p. 34; APA 1994; and WHO 1992). All autism spectrum disorders are defined by deficits in three-core areas: social skills, communication, and behavioral interests (Diagnostic and Statistical Manual of Mental Disorders – DSM-IV - 1994: pp. 70-71). Each child will display communication, social, and behavioral patterns that are individual but fit into the overall diagnosis of Autism Spectrum Disorder (ASD). Behaviors associated with autism fall on a continuum that is some individuals with autism are relatively high functioning with speech and intelligence intact, whereas others display severe language delays and are classified as mentally retarded (Abd Al Razag, 2007). Some individuals with it appear closed off and shut down, as if in their “own world” whereas others engage in repetitive behaviors and rigid patterns of thinking, (National Institute of Mental Health, (NIMH), 1997). Although people with autism do not share the exact same symptoms and deficits, they tend to exhibit similar problems in social, communication, motor and sensory development. 

During childhood, autistic children may fall behind their same-aged peers in the areas of communication, social skills, and cognition. In addition, dysfunctional behaviors may start to appear, such as self-stimulatory behaviors (i.e., repetitive, non-goal directed behavior, such as rocking, hand-flapping), self-injury (e.g., hand-biting, head-banging), sleeping and eating problems, poor eye contact, insensitivity to pain, hyper-activity/hypo-activity, and attention deficits emerge (APA, 1994). One characteristic that is quite common in autism is the individual's insistence on sameness (Abd Al Razag, 2007; Talat, 2005: p. 20). Many children become overly insistent on routines; if one is changed, even slightly, the child may become upset and tantrum (Talat, 2005: p. 20). Some common examples are drinking and/or eating the same food items at every meal, wearing certain clothes or insisting that others wear the same clothes, and going to school, for example, using the same route. One possible reason for insistence on sameness may be the person's inability to understand and cope with novel
situations (Abd Al Razag, 2007). Moreover, it is associated with certain perceptual and attention abnormalities and is commonly, but not universally, associated with mental retardation (Abd Al Razag, 2007; Wing, 1996). Contrary to Kanner's early belief that autistic children had good cognitive potential, approximately 75%-80% are mentally retarded, with the majority functioning in the moderate range of retardation (Ibrahim, 2005: p. 62; Hind, 2004: p. 28; and Campbell and Shay 1999). There are autistic adults who graduate from college and receive graduate degrees; and some develop adult relationships and may marry. In the work environment, many autistic adults can be reliable and diligent workers. Unfortunately, these individuals may have difficulty continuing to have a job. Since many of them are socially awkward and may appear to be eccentric or different, they often have difficulty with the job interview (APA, 1994; http://www.Autism.MedicalHelpers.com).

It is characterized by impairments in social relatedness, a need for routine and sameness, abnormal movements and sensory dysfunction. The social impairment in autism, in most cases, is present from birth or early in the life. Many autistic infants are different from birth. Two common characteristics they may exhibit include arching their back away from their caregiver to avoid physical contact and failing to anticipate being picked up i.e. becoming limp (NIMH, 2003). As infants, they are often described as either passive (Wafa, 2004: p.52; Hind, 2004: p.20) or overly agitated babies. A passive baby refers to one who is quiet most of the time, making little, if any, demands on his/her parents. An overly agitated baby refers to an infant who cries a great deal, sometimes with non-stop, during his/her waking hours (Wing, 1996: pp. 18-20; and Wienecke 2002). Children with autism fail to develop, or develop, in an unusual way. In the first few years of life, some autistic toddlers reach developmental milestones, such as talking, crawling, and walking, much earlier than the average child does, whereas others are considerably delayed (NIMH, 2003). Approximately two-thirds (⅔) of autistic children develop normally until
somewhere between one-and-a-half to three years ($1\frac{1}{2}$-3) of age; then autistic symptoms begin to emerge (Safwat, 2006; APA, 1994; and WHO, 1992).

Pinel (2007; p. 222) defined autism as “a neurodevelopmental disorder characterized by (1) a reduced ability to interpret the emotions and intentions of others, (2) a reduced capacity for social interaction and communication, and (3) a preoccupation with a single subject or activity”. Children with autistic disorder, have what DSM-IV terms qualitative impairments in several areas - namely, reciprocal social interactions, verbal and non-verbal communication including imaginative activity. They also have markedly restricted repertoires of activities and interests (The Autistically Handicapped, 2000). Carlson, (1999: p. 488) stated that autistic disorder includes affective, cognitive, and behavioral abnormalities.

**Symptoms**

Autism is a condition surrounded by myth and generalizations about people with autism that are rarely appropriate. The common beliefs that people with autism never express emotion, express aggression, exhibit dependency, never smile or laugh, never make eye contact, never talk, and never display affection, and all in all share the fact that they are similar, are simply that - myths (Wafa, 2004a: p.351-352; and Prizant, et. al 2000). Just as every person is unique, with his/her own personality and characteristics, every person with autism manifests the disorder in his/her unique way. Signs of autism can vary for each child or adult. The phrase often used is “Autism Spectrum Disorder (ASD)”. This is because autism has a large collection of symptoms (Fadela & Amal, 1999: p. 19). These symptoms and their severity vary greatly between individuals. The list of symptoms and behaviors associated with autism is long, and each affected person expresses his/her own combination of these behaviors (Wafa, 2004a: p. 47; 2004b: p. 19). None of these clinical features is common to all people with autism, and many are occasionally exhibited by people who are not autistic. Behaviors are a person’s response to how he/she is processing their
surroundings. Behaviors do not occur without a reason. They occur in reaction to how one is processing his/her environment. Autism Spectrum Disorder is exactly that, a spectrum disorder and the symptoms are defined by each individual’s behaviors. One can have two children with the same diagnosis but have any combination of symptoms. They may act completely different and with varying capabilities (Osman, 2002: p. 87; and Jamal & Mona, 1997: p. 285). The common thread is that the symptoms hinder the individual’s neurotypical development.

There are a number of associated features and behaviors that are seen in some people with autism, including the following:

**Physical Appearance**

“Their appearance is typically normal, however, there are a few minor abnormalities of ear structure – square shape, tops flopped over, and placement – positioned too low on the head, retailed slightly backward. This evidence suggests that autism is triggered by an abnormal event occurring between 20-24 days after conception, when the ears are developing” (Pinel, 2007: p. 223).

**Cognitive function**

Autism occurs at all intelligence levels (Ibrahim, 2004: p. 44/141-142). The performance IQ is generally higher than the verbal IQ. A small percentage has high intelligence in a specific area such as mathematics, art, etc. (The American Academy of child and adolescent psychiatry 2004).

**Neurologic function**

Seizures may develop in 25-35% of children with autism and can be resistant to treatment. The onset of seizures peaks in early childhood and again in adolescence. There is an increased risk of seizures in children with autism who have mental retardation or a family history of autism (Filipek et. al 1999; 29:439-84).
Repetitive behaviors

Although autistics usually appear physically normal and have good muscle control, unusual repetitive motions may set them apart (APA, 1994). These behaviors might be extreme and highly apparent or slighter. Some children and older individuals spend a lot of time repeatedly flapping their arms or walking on their toes, others suddenly freeze in position.

As children, they might spend hours lining up their cars and trains in a certain way, rather than using them for pretend play. If someone accidentally moves one of these toys, the child may be tremendously upset. Autistic children often need, and demand, absolute consistency in their environment. A slight change in any routine - in mealtimes, dressing, taking a bath, going to school at a certain time and by the same route- can be extremely be disturbing (Ibrahim, 2004: p.45; and APA, 1994). Perhaps order and consistency lend some stability in a world of confusion.

Sensorimotor deficits

Uneven gross and/or fine motor skills - well developed in some areas, are poorly developed in others (Filipek et. al 1999; 29:439-84). Impairments of gross and fine motor function are reported as being common in autistic individuals. Motor deficits are more severe in individuals with lower IQ scores. Hand or finger mannerisms, body rocking, or unusual posturing often manifest during the preschool years.

Sensory processing abilities are abnormal in autistic individuals and include preoccupation with sensory features of objects, over or under-responsiveness to environmental stimuli, or paradoxical responses to sensory stimuli (Ibrahim, 2004: p. 40).


1. Aggressive or self-injurious behavior
2. Noticeable extreme under-activity or over-activity
3. Throwing tantrums
4. Short attention span
5. Abnormal responses to sensory stimuli (expressing over-sensitivity or under-sensitivity to pain)
6. Abnormalities in eating or sleeping
7. Not responding to normal teaching methods
8. Playing in odd or unusual ways
9. Having inappropriate attachment to objects
10. Having no apparent fear of dangerous situations
11. Communication difficulties

Communicational symptoms

By age, 3 neurotypical children have passed predictable milestones on the path to learning language; one of the earliest is babbling. By the first birthday, a typical toddler says words, turns when he/she hears his/her name, points when he/she wants a toy, and when offered something distasteful, makes it clear that the answer is "no" (Stanley et al, 2003)

Some children may exhibit slight delays in language, or even seem to have precocious language and unusually large vocabularies, but have great difficulty in sustaining a conversation neurotypical-style (American Speech-Language-Hearing Association (ASLH) 1993, 35: 40-41). Some of them speak in limited phrases or conversations, and some have relatively normal language development some suffer the delay in total lack of development of spoken language.
Others may be delayed, developing language as late as the teen years. Still, inability to speak no more means that autistics are unintelligent or unaware than it does in a neurotypical with his/her mouth taped shut. Once given appropriate accommodations, many will happily "talk" for hours, and can often be found in spectrum chat rooms, discussion boards, websites (Carlton 1993).

The body language of autistics is uniquely designed for other autistics, and therefore can be difficult for neurotypical to understand. Facial expressions, movements, and gestures are appropriate for and easily understood by other autistics, but do not match those used by neurotypical (As cited in. Commerce-Database.com, last updated 2000). In addition, their tone of voice has a much more subtle inflection in reflecting their feelings, and the neurotypical auditory system often cannot sense the fluctuations - like a high-pitched, singsong, or flat, robot-like voice. Some children with relatively good language skills speak like little adults, rather than falling into the immature "kid-speak" that is common in their neurotypical peers (American Speech-Language-Hearing Association 1993, 35: 40-41). Singsong repetitions in particular are a calming, joyous activity that many autistic adults engage in. Many autistics have a strong tonal sense, and can often understand spoken language better if it is sung to them (Ashu, 2007). Speech development in autism takes a different path than in neurotypical toddlers. About 50% of the autistics remain mute throughout their lives (Suad, 2001: p.31), while being fully literate and able to communicate in other ways; images, sign language, and typing are far more natural to them (Ekman, 1993). Some toddlers, who later show signs of autism, coo and babble during the first few months of life, but they soon stop. Some show characteristic peculiarities of language known as pronominal reversal - reversal of the pronoun "I" and "you" (ibid). The autistic person will refer to him or herself as “you”. For example, when asking for water, he/she might say: “Do you want some water?” Naturally, this is the way they are asked what they want, and they identify themselves as “you”, not “I”.
Those who do speak often use language in unusual ways, retaining features of earlier stages of language development for long periods or throughout their lives. Some speak only single words, while others repeat the same phrase over and over; or repeat what they hear, a condition called echolalia (The American academy of child and adolescent psychiatry, 2004). Echolalia is a mechanical repeating or echoing of a word or phrase that someone else has said. The word or phrase is repeated with the same tone as the person who said it originally, but will seem to lack understanding of what he/she is repeating. Sometimes the echoing will reoccur days after the original phrase was said, this is called delayed echolalia.

With neurotypical often not understanding the autistic body language, and with autistic natural language not tending towards speech, autistic people often are forced to struggle to let others know what they need (As cite in: http://www.quantec.ch).

Some researchers have studied cerebral lateralization in autistic children. As known, the left cerebral hemisphere is the area that usually specializes in language. According to Dawson et al., (their language functions are centered in the right hemisphere. A study by Blackstock, 1978 (as cited in Clifford et al., 1986: pp. 633-634), illustrates this line of research.

Verbal and nonverbal communication deficits seen in autism are far more complex than simple speech delay, but overlap with developmental language disorders or specific language impairments (Waleed, 2006). Expressive language function ranges from complete mutism (as often seen in children 2-3 years of age) to verbal fluency, though verbal abilities are often accompanied by many errors in word meaning (semantics) or language and communicative deficits in social contexts (ibid).

**Mood and affect**

Mood and affect vary considerably, and may include being unaware of the feelings of others, withdrawn, or emotionally disturbed. Some people with
autism become outwardly anxious or they may become depressed in response to the realization of their problems. In some children with autism who express affection, the affection may be indiscriminate.

**Social symptoms**

From the start, typically developing infants are social beings. Early in life, they gaze at people, turn towards voices, grasp a finger, and even smile. In contrast, most autistic children prefer objects to faces and seem to have tremendous difficulty learning to engage in the give-and-take of everyday human interaction. Even in the first few months of life, many do not interact and will avoid eye contact, seeming indifferent to other people (Commerce-Database.com, last updated 2000). Autistic children often appear to prefer being alone rather than in the company of others and may resist attention or passively accept such things as hugs and cuddling without caring. Later, they seldom seek comfort or respond to parents' displays of anger or affection in a typical way. “Research has suggested that although autistic children are attached to their parents, their expression of this attachment is unusual and difficult to "read". To parents, it may seem as if their child is not attached at all”, (Greenspan et al., 2003). Parents who looked forward to the joys of cuddling, teaching, and playing with their child may feel crushed by this lack of the expected and typical attachment behavior (ibid).

Children with autism also are slower in learning to interpret what others are thinking and feeling. Subtle social cues whether a smile, a wink, or a grimace may have little meaning. To a child who misses these cues, "Come here" always means the same thing, whether the speaker is smiling and extending his/her arms for a hug or frowning and planting his/her fists on her hips (Wing and Gould, 1979).

Without the ability to interpret gestures and facial expressions, the social world may seem confusing. To compound the problem, people with autism have difficulty seeing things from another person's perspective (ibid). Neurotypical
(popularly described as "normal") five-year-olds understand that other people have different information, feelings, and goals than they have. An autistic person may lack such understanding, an inability that leaves them unable to predict or understand other people's actions (Talat, 2005: p. 34-35; and Ibrahim, 2004: pp. 117-119).

"Although not universal, it is common for autistic people also to have difficulty regulating their emotions. This can take the form of "immature" behavior such as crying or verbal outbursts that seem inappropriate to those around them. The autistic individual might also be disruptive and physically aggressive at times, making social relationships still more difficult. They have a tendency to "lose control", particularly when they are in a strange or overwhelming environment, or when angry and frustrated. They may at times break things, attack others, or hurt themselves. In their frustration, some bang their heads, pull their hair, or bite their arms" (Ashu, 2007; and Autism.MedicalHelpers.com.)

Prevalence

During the past decade, there has been a dramatic increase in the prevalence of autism (total number of existing cases). It is estimated to be 1 - 6 per 1000 (WHO, 2008). There has been considerable thought as to why this might be, with no conclusive proof emerging around any theory (Ashu, 2007). However, "studies have ruled-out the thought that the rise is (entirely) attributable to an improvement in diagnostic methods. Potential contributors to the rise in prevalence include earlier identification, improved diagnostic techniques, recognition of a broader range of severity than typified by classic Kanner autism, and less reluctance to make a formal diagnosis; because of the recent identification of effective educational and treatment interventions" (Talat, 2005: p.17; APA 1994). One of the most troubling aspects of having a child with autism is the confusion among professionals concerning diagnostic issues (Hind, 2004: p. 49; Jamal & Mona, 1997: p.285). Diagnosing autism can be
difficult because it resembles other disabilities of behavior, communication, and learning. Because autism is also a rare disorder, most professionals do not see enough cases to identify consistently subtle distinctions between this syndrome and related disabilities. The historical confusion between autism and emotional difficulties has further clouded the diagnostic picture. Over a period, autism has been misdiagnosed as many different disabilities: mental retardation, schizophrenia, development language problem, hearing impairment, or pervasive developmental disorder not otherwise specified (Wienecke, 2002).

Causal Factors

Although there is no known unique cause of autism, there is growing evidence that autism can be caused by a variety of problems:

1. **Genetic factors:** Autism has been found to run in families; various studies have shown that siblings of people with autism have about 5% chance of being diagnosed with the disorder (Pinel, 2007; p. 223). There is a greater likelihood that two monozygotic twins (i.e. identical twins) will have autism than two dizygotic twins (i.e., fraternal twins), as David Sue et. al, (2000: pp. 481-489) stated. In the case of monozygotic twins, there is a 100% overlap in genes; whereas in dizygotic twins, there is a 50% overlap in genes, the same overlap as in non-twin siblings. In a survey conducted in Utah, researchers identified 11 families in which the father had autism. Of the eleven 11 families, there were 44 offspring, 25 of whom were diagnosed as having autism. Wafa, 2004a: p.150, stated that there is less than 100% gene overlap.

2. **Viruses:** There is also evidence that a virus can cause autism. There is an increased risk in having an autistic child after exposure to rubella during the first trimester of the pregnancy (Wafa, 2004a: p. 155; Autism symposium, 2001: p.4; and Chandler, 1998). Additionally, there is speculation that viruses associated with vaccinations, may cause autism (Wafa, 2004a: p.152; Ashu, 2007; and Chandler 1998).
3. **Toxins and Pollution:** Environmental factors play an important role (Ashu, 2007). Although there is no scientific evidence at this time, there is growing concern that toxins and pollution in the environment can also lead to autism (Autism symposium, 2001: p.4). There is a high prevalence of autism in the small town of Leominster, where a factory manufacturing sunglasses was once located. Interestingly, the highest proportions of autism cases were found in the homes down-wind from the factory smokestack (Wing and Potter, 2002). A study conducted by Felicetti, (1981) revealed that there is high correlation between these variables. A study carried on 14 diagnosed autistic children whom their mothers lived near a plastic industrial unit revealed that there was no abnormal chemical substances found on those children's brains. Wafa, 2004a: p. 155-156, stated, “When one of the parents is exposed to chemical toxins, the probability of having an autistic child is somehow high.”

4. **Dysfunctional immune system:** A dysfunctional immune system has also been associated with autism. It is thought that a viral infection or an environmental toxin may be responsible for damaging the immune system. Researchers have found that many autistic individuals have a decreased number of helper t-cells, which help the immune system fight infection (ibid).

5. **Sensory impairments:** Many autistic individuals seem to have impairment in one or more of their senses. This impairment can involve the auditory, visual, tactile, taste, vestibular, olfactory, and smell senses. These senses may be hypersensitive, hyposensitive, or may result in the person experiencing interference such as in the case of tinnitus (a persistent ringing or buzzing in the ears). As a result, it may be difficult for individuals with autism to process incoming sensory information properly (ibid).

Sensory impairments may also make it difficult for the individual to withstand normal stimulation. For example, some autistic individuals are tactilely defensive and avoid all forms of body contact. Others, in contrast, have little or no tactile or pain sensitivity. Furthermore, some people with autism
seem to 'crave' deep pressure. Another example of sensory abnormalities is hypersensitive hearing. Approximately 40% of autistic individuals experience discomfort when exposed to certain sounds or frequencies (Irlen, 1997). These individuals often cover their ears and/or tantrum after hearing sounds such as a baby's cry or the sound of a motor. In contrast, some parents suspect their children of being deaf because they appear unresponsive to sounds.

6. Cognition: Theory of mind refers to one's inability to realize that other people have their own unique point of view about the world. Many autistic individuals do not realize that others may have different thoughts, plans, and perspectives than their own (Talat, 2005: pp.34-35; Ibrahim, 2004: pp. 177-119; and Baron-Cohen 1995).

About 10% of autistic individuals have savant skills. This refers to an ability, which is considered remarkable by most standards. These skills are often spatial in nature, such as special talents in music and art. Another common savant skill is mathematical ability in which some autistic individuals can multiply large numbers in their head within a short period; others can determine the day of the week when given a specific date in history or memorize complete airline schedules (Frombonne, 1999: pp. 769-786; cando.com/uci/ssi2000/savants.html).

"Many autistic individuals also have a narrow or focused attention span; this has been termed 'stimulus over-selectivity'. Their attention is focused on only one, often irrelevant, aspect of an object. For example, they may focus on the color of a tool, and ignore other aspects such as the shape. In this case, it may be difficult for a child to discriminate between a fork and a spoon if he/she attends only to the color. Since attention is the first stage in processing information, failure to attend to the relevant aspects of an object or person may limit one's ability to learn about objects and people in one's environment" (APA, 1994).
7. **Physical abnormalities:** Researchers have located several brain abnormalities in individuals with autism; however, the reasons for these abnormalities are not known nor are the influence they have on behavior. These abnormalities can be classified into two types: first, dysfunctions in the neural structure of the brain and second, abnormal biochemistry of the brain (Wafa, 2004a: pp. 186-187).

With respect to brain structure, Bauman and Kemper (1998, 57:645-652) examined postmortem brains of several autistic individuals and have located two areas in the limbic system, which are underdeveloped - the amygdala and the hippocampus. These two areas are responsible for emotions, aggression, sensory input, and learning. These researchers also found a deficiency of Purkinje cells in the cerebellum.

Children who are autistic appear to have accelerated brain growth well before any behavioral indicators appear. Courchesne has found that more than half of autistic children have an enlarged brain by the time they reach 14 months. This is the first time a potential early warning sign for autism can be identified (ABC Science online, 2003). Head circumference is elevated in a subgroup of children with autistic disorder without known co-morbid conditions. Increased head circumference is more common in boys and is associated with poor adaptive behavior. The increase in head circumference became pronounced in the first few years of life. The head circumference may then return to normal in adolescence (Aylward et al. 2002: pp. 175-83; Carol et. al 2005).

With respect to biochemistry, many autistic individuals have elevated levels of serotonin in their blood and cerebral spinal fluid, whereas others have relatively low levels of serotonin. Some suffer from abnormalities in: dopamine, norepinephrine, and neuropeptides. Recently oxytocin and vasopressin were found to play a role in autism symptoms (Wafa, 2004a: p. 188: arbl.cvmbs.colostate.edu/hbooks/pathphys/endocrine/hypopit/oxytocin.html, 1998)
There is also evidence that some autistic individuals have elevated levels of beta-endorphins, an endogenous opiate-like substance in the body. It is felt that those individuals who have an increased pain tolerance may likely be due to elevated levels of beta-endorphins (NIMH, 2003).

8. *Old aged father:* Some studies found that old aged fathers have a high probability of having autistic children. It was due to the exposition of the father to a great deal of infections, viruses, radiation, medicines etc. (Ali, 2006).

9. Researchers have found evidence that certain genes on the X chromosome may influence social interaction skills. Cuccaro et al., 1996 and Hallmayer et al., 1996 concluded, "There is no known reason why more males have autistic disorder than females. However, there is one theory. Chromosomes determine gender in humans. Females have two X chromosomes while males have one X and one Y-chromosome. Changes in genes on the X chromosome cause disease in males more often than females because males have only one X chromosome. Put in other words, if a gene on their only X chromosome does not work properly, they do not have an extra copy (as females do) to make up for it. If there is a gene that does not work properly on one of a female's X chromosomes, then the spare gene on the second X chromosome will compensate. Since males have autistic disorder more often than females, researchers have thought that autistic disorder might be associated with a gene on the X chromosome. However, research to date has not found an association between the X chromosome and autistic disorder" (Skuse 2000; pp. 9-16; Exploring Autism: info@exploringautism.org: 2002). In cases of autistic females, the level severity is quite high, and accompanied with mental retardation (Wafa, 2004b: p. 19).

**Severity of symptoms**

Autism presents in a wide degree, from those who are nearly dysfunctional and apparently mentally retarded to those whose symptoms are mild or remedied enough to appear unexceptional (normal) to the public (Safwat, 2006).
In terms of both classification and therapy, autistic individuals are often divided into those with an IQ<80 referred to as having "low-functioning autism" (LFA); it is accompanied with severe mental retardation (approximately 27%), while those with IQ>80 are referred to as having "high functioning autism" (HFA) is not accompanied with mental retardation (approximately 23%). The rest, which is approximately 50%, suffer mild to moderate mental retardation (Wafa, 2004a: p. 50). In fact, low and high functioning are more generally applied to how well an individual can accomplish activities of daily living, rather than to IQ.

This discrepancy can lead to confusion among service providers who equate IQ with functioning and may refuse to serve high-IQ autistic people who are severely compromised in their ability to perform daily living tasks, or may fail to recognize the intellectual potential of many autistic people who are considered LFA. For example, some professionals refuse to recognize autistics that can speak or write as being autistic at all, because they still think of autism as a communication disorder (Boyle et al 1994: pp. 863-865). Autism is a very complex disorder; and the needs of these individuals vary greatly. Since the year 1943, research, traditional and contemporary approaches are enabling experts and specialists to understand and treat these individuals (generationrescue.org). It is also important to mention that parents and professionals are beginning to realize that the symptoms of autism are “treatable” – i.e. there are many interventions that can make a significant difference, (Glascoe et al., 1989: pp. 955-958).

**Pervasive Developmental Disorders (PDD)**

Pervasive Developmental Disorder is an umbrella term used to define a wide range of disorders. “PDDs are manifested by pathology in all areas of mental function: behavior, cognition, and affect (emotion). They can often be reliably detected by the age of 3 years, and in some cases as early as 18 months (Filipek et. al, 1999: pp. 439-484). They pose significant problems for the
individual, parents, and society i.e. causes disruption in families and unfulfilled lives for many children” (Ashu, 2007). PDD can be differentiated into different categories according to the age of onset, course of development, and prognosis. The clinical subtypes of ASD/PDD recognized in official diagnosis (i.e. DSM-IV 1994, ICD-10, 1992 (International List of Causes of Death 10th edition) include: Autistic disorder, Asperger’s disorder, Rett’s syndrome, Childhood disintegrative disorder, and Pervasive developmental disorders-not otherwise specified (nslij.com/body.cfm?id=2868&oTopID=2868&PLinkID=2849, 2007: National Autism Association, 2004). Many people who engage in autistic behaviors have related but distinct disorders, i.e. exhibiting a group of seemingly unrelated features and a variation in symptom expression and level of severity by individual (APA, 1994; WHO, 1992).

This leads to confusion concerning the sub-groups or categories. The ICD-10 system divides pervasive developmental disorders into sub-groups, including Childhood Autism and Asperger's syndrome. DSM-IV has similar sub-groups, though the names are slightly different. Some clinicians are reluctant to diagnose an autistic disorder if the clinical features shown by an individual do not fit any of the sub-groups. Faced with these diagnostic difficulties, some take refuge in the category of Pervasive Developmental Disorder Not-Otherwise Specified. This vague diagnosis may lead to problems when the parents try to obtain appropriate education for their child. It is more important for clinicians to diagnose the presence of autistic disorder than to worry about the sub-groups; to be concerned with the needs of the individuals they are seeing (Wing & Gould, 1979: pp. 11-29).

Wing 1988, stated that "Diagnostic cut-offs have been hard to define, because the manifestation of the core impairments and behaviors of autism varies greatly from person to person". As cited in Gillian, et al. 2003;327: pp. 488-493.
The sub-groups are referred to in many situations as “autism”, more often referred to today as autism spectrum disorders (as derived from nimh.nih.gov/publicat/autism.cfm#2).

(1) Autistic disorder or Kanner’s Syndrome: Symptoms vary in any single person with autism, and as autism is a developmental disorder change occurs over time (ibid). There is no one word that can be used to describe every type of person with autism because there are many forms of this disorder. For example, some individuals are anti-social, and others are social. Some are aggressive toward themselves and/or aggressive toward others. Approximately half have little or no language, some repeat, (or echo) words and/or phrases, and others may have normal language skills. It usually manifests in the first year of life, and its onset is not later than the age of 3.

(2) Asperger's disorder, also called Asperger's syndrome: it is similar to high-functioning autism in how it affects a child's mannerisms and socialization traits. A distinction between Asperger's disorder and Autism is that young children with Asperger's often have normal language development, although the rhythm, pitch, and emphasis are irregular. Unlike Autism, Asperger's disorder does not delay other aspects of development; a child usually has age-appropriate, self-reliance and an interest in the world around him/her. However, like Autism, children with Asperger's disorder have abnormal social interactions, facial expressions, and gestures. It affects males 9 times more than females (Talat, 2005: p.23; and APA, 1994).

(3) Rett's disorder: which is a severe neurological disorder affecting almost exclusively females. It is relatively rare. Something between 6-18 months, autism-like symptoms begin to appear. The little girl no longer responds to her parents and pulls away from any social contact. If she has been talking, she stops, she cannot control her feet, she wrings her hands, i.e. full deterioration (Talat, 2005: pp.24-25; and APA, 1994).
(4) *Childhood disintegrative disorder*: is a heterogeneous collection of syndromes with onset after age 3 and prior normal development. At onset, a period of vague illness and mood changes arise. The child is generally irritable and complaining, followed by clearly apparent regression in multiple areas of developmental milestones achieved (ability to move, bladder and bowel control, social and language skills) following a period of at least 2 years of normal development. Put in other words, it can only be diagnosed if the symptoms are preceded by at least 2 years of normal development and the onset of regression is prior to age 10, (Talat, 2005: pp. 26-27; and APA, 1994).

(5) *Pervasive developmental disorders-not otherwise specified*: is known also as Atypical Autism or mild autism. It is the most common type. Those with PDD-NOS either do not fully meet the criteria of symptoms used to diagnose any of the 4 specific types mentioned above and/or do not have the degree of impairment described in the 4 types (Talat, 2005: p.28; and APA, 1994).

“The distinctions between these diagnoses focus on subtle differences in language development, severity, and age of onset (age at which symptoms first appeared), as well as other features that a health care provider can evaluate. For instance, the diagnosis of autistic disorder requires symptoms in all three of the areas described above, as well as a history of a delay in developing spoken language and onset of symptoms prior to 36 months of age,” (Safwat, 2006).

“By contrast, Asperger's disorder is an appropriate diagnosis for individuals who show many of the same features of Autistic disorder in all three areas, but who specifically do not have any delay in developing spoken language. Pervasive developmental disorder not otherwise specified (PDD NOS) is a diagnosis assigned to children who have symptoms in all three areas, but who do not meet the specific diagnostic criteria for any of the other pervasive developmental disorders,” (Rogiea 2001).
Differential diagnosis

In differential diagnosis, the task is to decide whether the triad of impairments is present, whether or not there are some other conditions as well. Language impairments resembling those in the specific disorders of language development, or poor coordination as in dyspraxia, may be diagnosed but the presence of the autistic triad of impairments may be overlooked. The many other conditions that can occur together with an autistic disorder can take attention away from the triad, which can be completely missed (Scothorne 1998).

There are a number of disorders, which can mimic autism or have autistic-like symptoms (Wafa, 2004a: p.89; and Baird et al. 2001) and therefore, autistic disorder must be differentiated from. Some of these are below:

1. **Phenylketonuria "PKU"**: A genetic disorder of the metabolism that will result in brain damage during the first years of life unless special dietary measures are taken. Inadequate production of the enzyme, which converts the amino acid phenylalanine into another amino acid, tyrosine. The extra phenylalanine accumulates in body fluids and converts to several chemicals that damage the brain. Symptoms include mental retardation as well as some of the symptoms of autism (Wafa, 2004a: p. 114; Rogiea, 2001: p.8).

2. **Obsessive-compulsive disorder "OCD"**: Obsessions are thoughts or images that are involuntary, intrusive, and anxiety provoking. Compulsions are impulses to perform a variety of stereotyped behaviors or rituals. It is often confused with obsessions and compulsions caused by mental illness or simple neurosis, in much the way that the term "Autism" has been used to refer to any person who is severely withdrawn. Clinical OCD has easily categorized symptomology that tend to occur at certain stages of life; counting and sorting usually start during childhood, "grooming" compulsions usually start at puberty, and "ruminating" (obsessions) usually begin during adulthood.

3. **Nonverbal learning disabilities**: is a communication problem with mild autistic symptoms and problems generalizing. The individual suffering from
these disabilities cannot link or merge pieces of information gained together to give a complete picture rather than small details. They may exhibit poor eye-hand coordination, poor fine/gross motor ability, poor visual-motor integration, poor motor skills, etc. (Ibrahim, 2004: p.89).

4. **Schizophrenia**: Is a mental illness, which can result in behavior similar to autism. The patient seems to live in his/her own world. But unlike autism, schizophrenia usually starts in adolescence or early adulthood, and involves delusions or hallucinations. Note that "Childhood Schizophrenia" was used to refer to what we now label "Autism" and that the former term is still used in some circles (Wafa, 2004a pp. 102-104).

5. **Attention Deficit Disorder "ADD"**: Is a disorder consisting of having a short attention span. Gillberg et al., 1996 38: 191-202, have proposed that there may be a continuum from ADD to autism. They propose that some kids are in the middle of the continuum, with a combination of ADD and autistic features. These kids often have “soft” neurologic signs (including fine and/or gross motor coordination problems) in addition to their ADD, and are socially awkward (Ibrahim, 2004: p.94).

6. **Attention Deficit Hyperactivity Disorder “ADHD”**: Another term for ADD when the person is also hyperactive. Thought to be caused by a chemical imbalance in the brain, which results in a biological deficiency in a child's ability to concentrate. Diagnosis of ADHD is a gray area: there are 18 criteria involved in identifying ADHD including such traits as inability to concentrate and aggressiveness (Wafa, 2004: pp. 98-100; Ibrahim, 2004: p.92).

**Early Screening and Diagnosis**

Screening refers to the use of measures with proven reliability and validity administered in a standardized uniform way (as cited in dbpeds.org/tutorial/main.cfm, 2005). It is a "brief assessment procedure designed to identify children who should receive more intensive diagnosis or assessment" (Abd Al Razag, 2007; Meisels et al. 1989). In the Concise Oxford
Dictionary English (2004, p. 1292) screening means “a system or act of screening the presence or the absence of something.”

Screening pin points a problem, which could be for example, autistic symptoms. It simply observes specific behaviors (for very young toddlers) or how a toddler responds to simple commands or questions (for older children). Screening instruments do not provide individual diagnosis but serve to assess the need for referral for possible diagnosis of autism. Diagnosis, on the other hand, rules-in-or-rules-out whether these are autistic symptoms or not.

Several screening instruments have been developed to quickly gather information about a child's social and communicative development within medical settings. Some screening instruments rely solely on parent responses to a questionnaire, and some rely on a combination of parent report and observation.

That said, however, "all people with autism have abnormal functioning in 3 core areas of development: social interaction, verbal and nonverbal communication, and the presence of repetitive, restricted, and stereotyped patterns of behavior, interests, and activities. The diagnosis of autism is typically made when impairment is significant in all 3 areas. Behaviors observed in each of the areas are necessary to receive a diagnosis of Autism Spectrum Disorder. They may have one or several behaviors in each category. The diagnosis of autism should include the use of a diagnostic instrument with at least moderate sensitivity and good specificity for autism" (Wafa, 2004b: pp. 21-23).

**Timing of Screening**

It is crucial that autism is recognized early in a person's life, to enable the most effective intervention and management of the condition. Early diagnosis and intervention is also essential to ensure families and caregivers have appropriate access to appropriate services and professional support. Identification and assessment of a child with possible autism should involve an
expert multidisciplinary team. This team must communicate with each other regarding their findings and recommendations (Nazik, 2006: p. 39; Hind, 2004). This process is not applicable in Khartoum State - for unknown reasons - which force some families to travel abroad to know what is going on with their child and to provide him/her with all services required, treatments, and management (Hind 2004).

The earlier screening is performed and developmental delays are identified, the earlier treatment can begin. “Early intervention is more effective than interventions started later in childhood” (Robin et al. 2001, pp. 131-144; Landa et al. 2007, pp. 853-864).

“It is recommended that screening tests should be regularly administered at the 9, 18, and 30 month well child visit” (First and Pafrey, 1994). For example, at 9 months, a targeted screening may reveal early communication, motor, and language skill delays. At 18 and/or 24 months, indications of autism may become more evident. The 30-month well child visit (when most children can speak in 2-word phrases) can be a key opportunity to detect language delays, as well as motor, social-emotional, and cognitive delays (ibid).

Developmental screening tests have natural limitations that have led to controversy regarding their use. Developmental testing of young children, whether for screening or evaluation has limited ability to predict future functioning but is a valid and reliable way to assess skills in a variety of domains.

Screening tools may not identify children with mild autism, such as those with high-functioning autism or Asperger's syndrome. During the last few years, screening instruments have been devised to screen for higher functioning autism. Among these screening tools are: (a) the Checklist of Autism in Toddlers (CHAT) developed by Baron-Cohen, et al., 1992; Baron-Cohen et al., 1996 (Ibrahim, 2004: p.146), (b) the Autism Spectrum Screening Questionnaire
Some of the instruments are reliable for identification of school-age children with Asperger's syndrome or higher functioning autism. These tools concentrate on social and behavioral impairments in children without significant language delay.

Since there are no physiological tests at this time to determine whether a person has autism, the diagnosis of autism is given when an individual displays a number of characteristic behaviors (Wafa, 2004a: p.89; aan.com/professionals/practice/index.cfm). However, medical and neurologic evaluation is required.

Two of the major challenges in the development of valid and reliable screening instruments for ASD are that (1) ASD is one of many developmental disorders that may co-occur and sometimes have similar presentation, and (2) as a spectrum disorder, ASD can be presented by individuals with a range of severity of symptoms and behaviors. Therefore, screening instruments often are developed with differing goals. For example, some instruments are well-suited to identify children on the autistic spectrum after they have already been identified as developmentally abnormal. Other instruments are designed to identify children on one end of the spectrum (the milder end), such as those with Asperger's syndrome. Additional tools may be useful in separating those at risk for ASD from those with speech and language impairment and so on and so forth.

In the Sudan autism is not well known, pediatricians, family physicians, care providers, teachers, and parents may initially dismiss signs of autism (Hind, 2004), optimistically thinking the child is just a little slow and will “catch up”.

(ASSQ), (c) the Australian Scale for Asperger's Syndrome, and the most recent, (d) the Childhood Asperger's Syndrome Test (CAST).
Growth and Development Milestones

There is a wide range of what clinicians consider healthy or “typical’ growth and development: one child walks at nine months; another walks at twelve months. Milestones, or fixed markers of individual progress, help establish the outer limit for the range of healthy development. However, within the range of typical development, there is tremendous variation and great opportunity for individual difference (Stanley, 1999). In other words, there are wide individual differences in growth patterns (Phillip, 1995; p. 145).

The advantages of developmental screening instruments are that they state their norms explicitly, serve as a reminder to the pediatrician to observe development, are an efficient way to record the observations, and help the pediatrician identify more children with delays. The major disadvantage to the pediatrician is that they take time, effort to administer, and interpret. Therefore, developmental screening instruments are not widely used in pediatric practice (Dobos 1992; Scott et al. 1993).

Developmental Surveillance and Developmental Screening

A recent practice parameter from the American Academy of Neurology, which was supported by the American Academy of Pediatrics, called for the routine screening of all children for autism. And stated that identification requires two levels of investigation. Each level addresses a distinct component of patient management. For these two areas of investigation, specific clinical questions were defined, clinical evidence was summarized, and diagnostic recommendations were developed (aan.com/professionals/practice/index.cfm; Abstract of Practice parameter- Screening and diagnosis of autism. Neurology 2000, 55: pp. 468-479.)

Developmental surveillance is the term that most accurately describes the approach currently practiced by many health care providers and other professionals for the early detection of developmental problems. Developmental surveillance is an important technique used by pediatricians. Dworkin (1993:
defined developmental surveillance as “a flexible, continuous process whereby knowledgeable professionals perform skilled observations of children during the provision of health care”. Periodic developmental surveillance by appropriately trained and qualified health care providers is important for all young children. “Such routine surveillance provides an active way to identify developmental problems as early as possible. Appendix (9) shows how to integrate developmental surveillance and screening into well-child visits adapted from: Council on children with disabilities section on developmental behavioral pediatrics, identifying infants and young children with developmental disorders in the medical home: an algorithm for developmental surveillance and screening. Pediatrics 2006; 118(1): 405-420

It is recommended that: (1) the process of routine developmental surveillance should be ongoing and begin at birth. (2) developmental surveillance for young children should include the following components: (a) eliciting and attending to parents’ concerns, (b) Obtaining a relevant developmental history, (c) Observing children accurately, and (d) Sharing opinions and concerns with parents and other professionals who care for the child” (ibid).

Developmental surveillance may be done using parent questionnaires and/or formal screening tests of general development to gather information. All of this information gathered by parent questionnaires and/or screening tests of general development is then reviewed by professionals involved with the developmental process and discussed with the child's parents.

Meisels et al. 1989: pp. 192-195, said, "Pediatricians often use age-appropriate developmental checklists to record milestones during preventive care visits as part of developmental surveillance".

During the course of surveillance, the professionals may note certain behavioral characteristics that increase concerns that the child may have a specific developmental problem. These concerns may be based on clinical clues
noted during the exam, information about risk factors, and parental concerns. Results of a general developmental screening test may also raise concerns about specific developmental problems. Such suspicions may lead the health care provider to do selective screening for a particular developmental problem such as autism or a communication disorder. Selective screening sometimes involves the use of screening tests specifically designed to identify children with that particular developmental problem.

As part of developmental surveillance of young children, it is important to make sure children have attained developmental milestones. If a child has missed, the milestones may be the first indication of possible autism in a child. A developmental assessment for children under age 3 is an attempt to assess various aspects of the child's functioning, including areas such as cognition, communication, behavior, social interaction, motor and sensory abilities, and adaptive skills. Assessment of the family and the child's environment also provides important contextual information.

It communicates the pediatrician's interest in the child's development, not just his/her physical health (Kaminer and Jedrysek 1982: pp. 427-437). “Developmental evaluation may lead to a definitive diagnosis, development of an interdisciplinary comprehensive plan of remediation, realization that there is no significant problem, or a decision that additional observation is necessary”.

Screening and surveillance go hand in hand. Developmental screening can only show that a child is probably behind others. It does not reveal much about causation, for example.

Talat, (2005: p.38), named the process of developmental surveillance as “flow chart”. He indicated the importance of having an overall picture, either than investigating on specific causal factors. Talat, as many others, recognized the importance of multidisciplinary team. Periodic health examinations provide specific opportunities for routine developmental surveillance in young children. During these exams, parent reports about their child’s behaviors and direct
observations of the child by the examiner may provide useful clues to help identify concerns about possible developmental problems, including autism. The periodic exams at 9, 18, 24 and 30 months are particularly useful in providing information about possible autism, since characteristics of autism often begin to emerge during the second year of life (Abd AlRazag, 2007).

As stated before, routine screening is crucial because of autism’s prevalence, the difficulty in diagnosing the disorder, and because children with autism who receive early identification and intensive intervention have the best prognosis. Despite these reasons and recommendations, most children are never screened for autism. However, when a routine developmental screening raises concerns, or a child is at risk of atypical development, an autism screening is very important. The basic screening for autism is as simple as the disorder is complex.

The science of developmental testing has improved in the last years, making it easier for the pediatrician to accurately and efficiently screen development. Parental report of skills and concern had been considered too inaccurate to be used as a screening tool alone. However, several studies have shown that parental report of current skills is predictive of developmental delay (Doig et al. 1999: pp.358-362; and Diamond 1993:68-81); Developmental Surveillance and Screening of Infants and Young Children Pediatrics, 2001).

This has led to the development of parental report instruments, that have been well tested in economically and culturally diverse populations and provide accurate information about development. Barriers to the use of parent report instruments are the inability to read or understand the language. Both of these can be easily overcome through oral administration or translation. The explicit use of parental reports has the added advantage of parents being active participants in the evaluation of their children and shows respect for their expertise.
Although the characteristics of autism are generally evident in the first few years of life, the condition can go undetected for many years, especially in those who are the more able end of the spectrum where the signs are more subtle. People at the more able end of the spectrum are often aware that they are different from other people and that they have difficulty in forming or maintaining relationships. If undiagnosed, their behavior can appear odd, which can lead to bullying or teasing at school. Depression therefore can be a feature, as the person gets older (Journal of the American Academy of Child and Adolescent Psychiatry, 2000).

The emphasis on earlier identification creates the opportunity to provide the benefits of early intervention but also poses greater challenges in screening. Detecting developmental delays early is challenging.

The non-specific and variable nature of autism does not make it easy for a parent to identify a problem. It is easier to describe a pain in the leg, for instance, than a feeling that something is not quite right.

Dobos et al. (1992) and Smith (1978) stated that, "Because screening needs to be periodic, a child not detected by a single screening will be detected by a subsequent screening. Children who have been over-referred may benefit from other community programs as well as a close watch on their development. However, when pediatricians use only clinical impressions rather than formal screening, estimates of children's developmental status are much less accurate," (as cited in aappolicy.aappublications.org/cgi/external_ref?access_num=690784&link_type=MED). Several standardized tests and checklists have been developed to help assess the behavior of children with possible autism. These tests are also intended to further evaluate children in whom autism is considered possible (due to parent concerns, clinical clues, and/or positive screening test results). These assessment instruments can be used in various ways in assessing children with possible autism. Sometimes these instruments can be used to determine if autism
is likely, so that a decision can be made to seek a specific diagnosis. At other times, some of these assessment instruments may be used as part of the formal diagnostic process. What is more, in certain instances some of these instruments may be used to rate the severity of symptoms, which may be useful in assessing interventions, periodic monitoring of the child's progress, and assessing outcomes. These include:

(a) Autism Behavior Checklist (ABC; a behavior checklist completed by a parent).
(b) Autism Diagnostic Interview-Revised (ADI-R; a structured interview)
(c) Childhood Autism Rating Scale (CARS; a test combining parent reports and direct observation by the professional).
(d) Pre-Linguistic Autism Diagnostic Observation Schedule (PL-ADOS; a test using direct observation of the child's behavior as elicited by the examiner).

The four tests (ABC, ADI-R, CARS, and PL-ADOS) are individual autism assessment instruments that have been specifically designed to assess children with possible autism. All of these tests rely on either historical information about the child's behavior (usually provided by a parent), direct observation of the child by a professional, or a combination of these methods.

Tests that rely on historical information may be in the form of behavior checklists or structured interviews. Behavior checklists such as the ABC are lists of questions to be completed by parents and later scored by a professional. Various versions of the ADI are composed of a prescribed set of questions and interview protocol that the professional uses to question the parents.

Tests that rely on direct observation of the child (such as the PL-ADOS) often prescribe specific ways for the examiner to elicit responses from the child. These tests also have a standardized method for scoring the observed behaviors. The CARS was the only autism assessment instrument reviewed that combines both historical information from the parent and direct observation of the child by
the professional. The CARS also provides a total score that can rate the severity of behavior. The diagnosis of autism is based on clinical judgment regarding observations of the individual's behavior. Information from family members and other observers is of primary importance in making the diagnosis; however, the pediatrician may order tests to rule out other conditions that might be confused with autism, such as mental retardation, metabolic or genetic diseases, or deafness etc., (as cited in bei@health.state.ny.us, 1999).

**Variation in manifestations of features**

The manifestations of the diagnostic criteria vary widely. Examples are listed briefly in the ICD-10 research criteria manual and the DSM-IV manual, but they cannot cover the whole range. For example, most diagnosticians would classify insistence on doing nothing but lining up toy cars in a precise sequence as an elaborate repetitive routine, but some may not recognize insistence on verbally retelling facts about cars, regardless of the social situation, as another manifestation of the same phenomena. Most recognize social impairment in a child who ignores people but is fascinated by trains, but some fail to see that a child who wants to have friends but approaches other children in bizarre, inappropriate, repetitive ways is socially impaired. Eye contact is a particular disadvantage (Safwat, 2006). Visual avoidance is easy to detect; it is harder to recognize inappropriate use of eye contact as equally diagnostic (Scothorne 1998).

All infants and young children should be screened for developmental delays. Screening procedures should be incorporated into the ongoing health care of the child as part of the provision of a medical home, as defined by the American Academy of Pediatrics, 1992; 90:774. As a child grows and develops, parents may watch with both wonder and worry. Friends and family, books and magazines offer advice to guide parents through the complex developmental process. Nevertheless, the most important way to monitor the healthy growth and development of a child is through an active partnership of parents and
healthcare providers. To this partnership, a parent brings powerful observation and experience, fortified by a sense of love and responsibility. A physician ensures that the full range of a child’s development (physical, cognitive, and social-emotional) is monitored at each well visit. Through observation, measurement, screening, and listening and sharing with parents, a physician evaluates a child’s healthy development.

**Checklist for Autism in Toddlers (CHAT)**

**Background**

A group of British researchers developed a behavior checklist (questionnaire) that helped in identifying toddlers (18 to 24 months) at risk for autism to get treatment earlier. It was published in 1992 (Baron-Cohen, et. al., 1992). It was considered a first-level screening method. CHAT is a brief screening instrument, and takes only about five to ten minutes to administer and score (see ). Specific training is not required, and it can be administered by a variety of individuals. It can be used by parents and health care workers to identify toddlers who are at risk for developing autism, and other developmental disorders.

Children with an absence of joint attention or ability to “follow where the adult is looking” (that is a term first introduced in the CHAT by Baron-Cohen), including protodeclarative pointing, gaze monitoring and pretend play at 18 months are at high risk of autism. Section A of the CHAT is a self-administered questionnaire for parents, with 9 yes/no questions addressing the following areas of child development: rough and tumble play, social interest, motor development, social play, pretend play, protolcmperative pointing (pointing to ask for something), protodeclarative pointing, functional play, and showing. Section B of the CHAT consists of 5 items, which are recorded with observation of the children by general practitioners or health visitors. The 5 items address the child’s eye contact, ability to follow a point (gaze monitoring), pretend (pretend
play), produce a point (protodeclarative pointing), and make a tower of blocks. (Baron–Cohen, (1996), 168, pp. 158-163; (1992), 161, pp. 839-843.

If screening using the CHAT suggests possible autism, or any other disorder, further assessment is needed to determine a diagnosis. If autism was unlikely, it is still important to: (a) assess the child for other developmental or medical problems that may have caused the initial concern. (b) continue regular periodic surveillance for problems that may be related to the cause of the initial concern.

Writing in the June issue of the Journal of the American Academy of Child and Adolescent Psychiatry 2000: pp. 694-702, Charman et al. concluded, "The CHAT can be used to identify cases of autism and related pervasive developmental disorder at 18 months of age." They noted, however, that the checklist is a screening tool only, and children identified through the screening tool require more detailed examination by experts. “It is emphasized that the CHAT is not a diagnostic instrument but can identify potential cases of autism spectrum disorders for a full diagnostic assessment”.

CHAT Scoring

The key questions or critical items are: A5: pretend play, A7: protodeclarative pointing, B2: following a point, B3: pretending and B4: producing a point (Baron-Cohen et al. 1996).

Risk of autism: According to CHAT there are 3 levels:

(1) High risk: the toddler fails A5, A7, B2, B3 and B4.

(2) Medium risk: the toddler fails A7 and B4.

(3) Low risk: the toddler fails 2 or more no answers.
Modified Checklist for Autism in Toddlers (M-CHAT)

Background

The M-CHAT is one of a few tools, which show promise as a screening tool in different populations of unselected children (Pediatrics Vol. 114 No. 2 August 2004). It has been translated into Turkish, Japanese, and Spanish, and one study has been published which used the M-CHAT translated into Chinese (City Health information, 2008, pp. 9-16). It will be important to evaluate the findings of ongoing studies using the M-CHAT in these different languages and cultures (Thyde 2005).

The M-CHAT is an expanded American version of the original CHAT from the U.K. It consists of 23 questions, with 9 questions from the original CHAT and an additional 14 questions addressing core symptoms present among young autistic children. The original observational part (i.e. section B) is omitted. The M-CHAT is designed as a simple, self-administered, parental questionnaire for use during regular pediatric visits. The more questions children fail, the higher their risk of having autism.

The designers of M-CHAT proved that it has a better sensitivity than the original CHAT, because children up to 36 months of age are screened, with the aim of identifying those who might regress between 18 and 36 months. In other words, the M-CHAT tests children of 18-36 months of age, whereas the CHAT tests children at 18 and 24 months.

The 6 best questions of the M-CHAT address areas of social relatedness (interest in other children and imitation), joint attention (protodeclarative pointing and gaze monitoring), bringing objects to show parents, and responses to calling (see appendix 3). Joint attention is addressed in the original CHAT, whereas the other areas were addressed only in the M-CHAT (Charman, et al 2001:, 31:145-148).
The screening checklist used by the researcher, M-CHAT, is one of a few tests, which show promise as a screening tool in different populations of children (electrical version; Pediatrics Vol. 114 No. 2 August 2004). The developers were concerned that developmental delay might be missed in one behavioral observation session (Robins, 2001: p31:131-144).

**M-CHAT Scoring**

A child fails the checklist when 2 or more critical items (key questions) are failed or when any 3 items are failed. The six critical items are Q2, Q7, Q9, Q13, Q14, and Q15.

Yes/no answers convert to pass/fail responses. Not all toddlers who fail the checklist will meet the criteria for a diagnosis on the autism spectrum. However, toddlers who fail the checklist should be evaluated in more depth by physician or referred for developmental evaluation with a specialist.

**Difficulties in diagnosing autism**

The difficulties in diagnosing autistic conditions experienced by clinicians arise mainly for the following reasons:

1. Delays or deviations in development may come to the attention of professionals and parents because a child is known to have risk factors by history, has physical findings or medical conditions likely to be associated with delays, or manifests delays at the time of observation (Glascoe, 1996: 89-128; Dworkin, 1992: 89:1253-1255).

2. A delay in a skill becomes evident only at the age when a specific developmental milestone is expected (ibid).

3. Early recognition of delays requires in-depth knowledge of the precursors (sign) to the skill as well as clinical judgment. Waiting until a young child misses a major milestone, such as walking or talking, may result in late
rather than early recognition. It is especially important to recognize delays in language skills early, because early intervention may improve the outcome of children with hearing loss and may enable earlier diagnosis of children with mental retardation and pervasive developmental disorders (ibid).

4\ Mild delays and deviations are often hard to detect, because children develop in spurts and, at times, discontinuously. Developmental disabilities also involve a spectrum of problems of varying kinds and severity. Although there is broad agreement as to what constitutes clear-cut delay or deviation, there is not complete agreement among professionals or between parents and physicians as to the severity at which evaluation and intervention become appropriate.

5\ Child development is a dynamic process and is often hard to measure by its very nature. The various streams of development, including gross motor, fine motor, language, cognitive, and adaptive behavior, are interrelated and complex within themselves. Children develop skills variably and show a new skill randomly when first mastering it. A single test at one point in time only gives a picture of the dynamic process, making periodic screening necessary to detect emerging disabilities as a child grows.
Chapter Three
Method and Procedures
Methodology of the Research

Research design

The researcher had applied an integrative research method, which involve more than one method for collecting data.

First, this research is a trend research in nature (i.e. using existing data) data that have been collected and reported by others (Amna & Lee, 1990: pp. 41-42). It combines the usage of existing data and the collection of new data. It is a kind of replication research, because it is based on the comparison of data collected by the researcher and data reported for an earlier study by other researchers. However, it was conducted in a different ethnic group (i.e. Sudanese). Second, the researcher have applied the action research method, which "aims to contribute both to the practical concerns of people in an immediate problematic situation and to further the goals of social science simultaneously (Thomas et al., 1986: p.161). Action research is "most valuable when you have to be responsive to the changing demands of a situation. For this reason, it can also be used for evaluation of an ongoing program" (Dick & Swepson, 1997).

Time line

The data was collected in a time span of 4-5 months (January - March) during the year 2007. Accordingly, analysis was accomplished by the end of the same year.

Area of research

The research was conducted with some already diagnosed autistic toddlers and non-autistic toddlers at Khartoum state (Khartoum, Khartoum North, and Omdurman) Ethiopia, Emirates, and Saudi Arabia.

Data resources

This study relayed on different methods and resources of information that included:
• Books and references relating to autism, and child development
• Previous studies
• Internet websites relevant to the topic
• Chatting rooms constructed with families of autistic and non-autistic toddlers living abroad
• The screening device M-CHAT

Study population

Raja’a Abu Alam (1998: p. 316), defined the term population as a group that shares certain characteristics. Therefore, the population under investigation in this study were some Sudanese toddlers of age ranging between 18-36 months. The population was of two types; autistics and non-autistic.

Sample

The researcher used purposive sampling method as it enables a sample selection that is believed to be representative of the population, and can lead to very good samples. Proper purposive sampling depends on two assumptions: (1) the researcher can identify in advance the characteristic that collectively capture all variation, and (2) the chosen sample will correctly reflect the distributions of these characteristics (ibid).

A sample of 200 Sudanese mothers of autistic and non-autistic toddlers was interviewed by the adapted Modified Checklist for Autism in Toddlers. The study sample was made up from some autistic and non-autistic toddlers living in Khartoum State, Ethiopia, Saudi Arabia, and Emirates. 65 males and 35 females of age ranged between 18 and 36 months were selected for each study group. As the sample was purposively selected, bearing in mind mostly age and the disorder, the sex was not considered (table 2 & 3).
Characteristics of sample

*Table (1) Location of autistic and non-autistic toddlers*

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of autistics</th>
<th>Number of non-autistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sudan</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>Emirates</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

The number of autistic toddlers was decided on according to the purposive sampling, it was a complicated process for the researcher. As a result, the number of non-autistic was chosen to match that of autistic and from the same environment.

*Table (2) Sex of toddlers (autistic and non-autistic)*

<table>
<thead>
<tr>
<th>Sex</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>130</td>
<td>65.0</td>
</tr>
<tr>
<td>Female</td>
<td>70</td>
<td>35.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>200</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Table (2) indicates that the majority (65%) of the selected sample in each group (i.e. autistic and non-autistic) were males whereas (35%) were females. This result was mainly due to the fact that the toddlers were purposively selected, as it is difficult to find diagnosed autistic toddlers. Besides, the researcher aimed at selecting the same sex number for those non-autistics so as to avoid any statistical problems, and allow comparison between both
sexes. Females found to be less in number could be attributed to the ratio of male to female is 4:1.

**Table (3) Age of toddlers (autistic and non-autistic)**

<table>
<thead>
<tr>
<th>Age range</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-24 months</td>
<td>41</td>
<td>20.5</td>
</tr>
<tr>
<td>25-30 months</td>
<td>74</td>
<td>37.0</td>
</tr>
<tr>
<td>31-36 months</td>
<td>85</td>
<td>42.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>200</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Table (3) indicates that children aged from 18-24 months represented 20.5% of each sample; 25-30 months 37% and 42.5% fell in the age range 31-36 months.

Non-autistics falling in each age group were purposively selected to match those autistics in the same age group in order to keep away from any statistical hindrance and to allow more space for comparison.

**Procedures**

**Research tool**

The research tool used is the adapted M-CHAT (see appendix 3), in which certain items served in the identification of toddlers with and without autism.

**Validity and Reliability of the original version of M-CHAT**

1101 children participated in the norming studies of the M-CHAT and were consecutive patients receiving well care at pediatric practices or referred for screening at early intervention services (Robin, et al. 2001). The M-CHAT was sensitive to the presence of ASD at 87%, Cronbach’s alpha was produced for all items and was found to be high (0.85).
Validity and Reliability of the adapted M-CHAT

As far as the researcher’s knowledge, and after searching for studies concerning the application of the M-CHAT, the researcher came to the fact that there has been no study conducted with the original M-CHAT in the Sudanese population. The researcher intended to adapt it, for there could be cultural differences that may lead parents to not responding in the same ways. The original M-CHAT was written in English.

The key stages the researcher followed were four. Stage one: the original screening tool (M-CHAT) came into possession through the worldwide web - Journal of Autism and Developmental Disorders, April 2001 and firstsigns.org. (see appendix 3) And was applied in this study with permission from the original founders.

In stage two, it was translated into Arabic language. English/Arabic committee of specialists/experts carried back-translation (see appendix 8), in which the checklist was translated into the first. This process was to ensure that it is equivalent enough that results can be compared.

Stage three, was administered by a committee of experts in the field of psychology and psychiatry to judge its efficacy (see appendix 4 and 6). Rewording and reforming was conducted and accomplished and it was found to be valid.

In stage four: 30 toddlers already diagnosed as autistic, participated in the norming of the M-CHAT. The trial study (pilot study) was administered and involved their parents. The screening device showed to need no more modification or reforming. It was simply stated and questions were clear and forward.

In addition, the inter-item correlation was applied. Cronbach’s Alpha that was used is an index of reliability associated with the variation accounted for by the true score of the underlying construct. Construct is the hypothetical variable that is being measured (Hatcher, 1994). Alpha coefficient ranges in
value from 0 to 1 and may be used to describe the reliability of factor extract from dichotomous (i.e. questions with two possible answers) and/or a multiple formatted questionnaires or scales (i.e. ranging scale: 1= poor, 5= excellent). The higher the score, the more reliable the generated scale is. Nunnaly (1978) has indicated 0.7 to be an acceptable reliability coefficient but lower thresholds are sometimes used.

The adapted M-CHAT proved to be accurately translated and detects symptoms the original version does. It satisfied the criteria of validity and reliability. By valid it is meant, to what extent the test accurately measures, which it purports to measure i.e. the ability to separate or distinguish those who are autistic from those who are not (Yerushaly in 1940s: p.62). Reliability on the other hand, means that the test give consistent results when repeated more than once on the same individual or toddlers under the same condition).

The researcher aimed at splitting the checklist into 2 parts when running the process of reliability, to ensure that the key best questions are really reliable and detect signs of autism. Part 1 was made up of the 10 key-questions: Q2, Q7, Q9, Q11, Q13, Q14, Q15, Q18, Q20, and Q22. Part 2 was composed of all questions of the checklist.

Reliability statistics based on the inter-term correlation to each part alone was performed to make sure that each part, separately, is reliable and has a stable response. Question 16 (Can your child walk?) was found to be unreliable and negative so it was withdrawn. Once more inter-item correlation was administered to the 22 questions, (i.e. the adapted M-CHAT) and was found to be high.

<table>
<thead>
<tr>
<th>Checklist</th>
<th>Number of items</th>
<th>Cronbach's Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>key questions</td>
<td>10</td>
<td>0.920</td>
</tr>
<tr>
<td>Total of questions</td>
<td>22</td>
<td>0.976</td>
</tr>
</tbody>
</table>

Table (4)
Based on the reliability and validity attained from the standardization of the adapted M-CHAT, the researcher collected the data through interviewing the sample selected, those found abroad were interviewed through the online technique, while others were interviewed face-to-face. A copy of the adopted M-CHAT was sent via e-mail, for those abroad, as a hard copy available in hand. The interview was conducted after assigning a suitable time schedule for both parties (parents and researcher). Concerning abroad families, questions were asked and answered all the way through by “chatting”, and the following chapter discusses the results and analysis achieved.

Data collected was statistically analyzed through SPSS. The t-test was used to assess whether the means of the two groups under study statistically differ from each other. Descriptive statistics was used to describe the basic features of the data in study. It provided a simple summary about the sample and the measure, which included the minimum (the smallest number in the set of scores), the maximum (the biggest number in the set of scores), the mean or the arithmetic average of the group of scores, and the standard deviation which provides a reference of a group of scores to the normal curve or, describes the variability in a group of scores. Moreover, Analysis of variance - (ANOVA) to assess whether there is difference in the M-CHAT was also applied.

While some families were very much preservative, and refused to cooperate, others were very brave and allowed the researcher to enter into their lives and find out problems and obstacles they faced throughout their journey with autism. They asked to keep their names as well as their residents as ‘off the record’ and confidential. Accordingly, and as part of the research ethics, the researcher respected their request and did not reveal any piece of information, which could lead to them and the checklists were filled behind closed doors.
Chapter Four
Results & Discussions
Results and discussion

In this chapter, the researcher will state down the statistical analysis of the M-CHAT filled by autistic and non-autistic toddlers’ parents and discuss the results accomplished.

Table (5): T-Test for two independent samples to assess whether the 2 groups of toddlers (autistic and non-autistic) differ in their means

<table>
<thead>
<tr>
<th>Groups compared</th>
<th>Sample size</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>df</th>
<th>t</th>
<th>Sig. (2-tailed)</th>
<th>Inference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autistic</td>
<td>100</td>
<td>39.32</td>
<td>3.83</td>
<td>198</td>
<td>32.11</td>
<td>0.000</td>
<td>Difference exist between the 2 groups, sig.=0.05 (M-CHAT has the ability to rule-in or rule-out a toddler as being autistic or not)</td>
</tr>
</tbody>
</table>
| Non-autistic    | 100         | 26.09| 1.51               |     |      |                | Difference existed between the 2 groups (autistic and non-autistic). It is clearly seen that M-CHAT has the efficacy and ability to differentiate between toddlers whom are autistic and those not. The T-test was highly significant at p= 0.05, the value of the t test was 32.11. Referral becomes a necessity if the respondent ticked 2 or more “no” answers to the critical items (key questions) 2, 7, 9, 13, 14, and 15, in addition, ticked a “yes” answer to items 11, 17, 19, or 21 (see appendix 4 and 6). Many indicators and signs of autism matched and met the criteria in the Diagnostic and Statistical Manual of Mental Disorders, 4th edition. The sample revealed the following: Social-emotional skills (Q1, Q2, Q4, Q18, and Q22) By age 3 months, the toddler should be able to smile socially, laugh in playful situations at age 6-8 months, and show the ability to be consoled by 1
year. By age 2 he/she should demonstrate consistent eye contact, and show engagement with other children or other adults, (First and Palfrey, 1994: pp. 478-483).

In autistic toddlers, there may be a failure to cuddle, an indifference or aversion to affection or physical contact. Toddlers with this disorder may treat adults as interchangeable (identical) or may cling mechanically to a specific person. The child tends to treat other people in unusual way e.g. expecting other people to answer ritualized question in specific ways, having little sense of other people’s boundaries, and being inappropriately intrusive (disturbing) in social interaction. They suffer difficulty relating to people. No spontaneous sharing of enjoyment, interests, or achievements with others was seen in the sample. Gross impairment in ability to make peer friendship, lack of social or emotional reciprocity, and failure to develop peer relationships appropriate to developmental level was evident.

Communication/Language skills (Q6, Q7, Q10, Q12, Q19, and Q20)

By age 5-6 months the toddler babbles, says “da” or “ba” when reaches 8-9 months, and uses 3 words with meaning at 18 month. Toddlers selectively attend to parental speech sounds by age 1, use 2-word phrases when 2 years, and use 1 personal pronoun when 2½ years (ibid). By one month of age, non-autistics can discriminate the faces of their mothers from the faces of strangers. By 7 months of age, they can discriminate between fearful and happy facial expressions (Philip, 1995; p. 162). Facial expression is significantly important to the communication of emotion (Ekman, 1993; p. 48)

The sample revealed to have qualitative impairment in communication being verbal or non-verbal. Toddlers with autism vary widely in abilities and behaviors. Communication impairments include deficits in use of protodeclarative gestures and ability to communicate emotion.
In autism, one of the earliest signs detected by mothers is a lack of eye contact. Gaze avoidance, facial expression, and severe deficits in language comprehension were present in most cases.

Pointing refers to protodeclarative pointing that is the use of the index finger to indicate an item of interest to another person. Toddlers typically learn to utilize protodeclarative pointing to communicate their concern for an object to others. As a screening question “Does your child ever use his/her index finger to point, to indicate interest in something?”, Baron-Cohen and colleagues (1996, 1992) have demonstrated that the absence of a positive response to an inquiry about protodeclarative pointing is predictive of the later diagnosis of autism. The absence of a positive response to this question suggests the need for a specialized assessment for possible pervasive developmental disorder. Expressive gestures are used to get others to do things for them but not to convey feelings. A person with autism often has problems understanding the meaning and purpose of body language. They find social interaction difficult, confusing, and scary.

*Cognitive skills (Q14, Q19, and Q22)*

By age 2-3 months the toddler should be alert to mother, with special interest, search for dropped objects at 6-7 months, show interest in peek-and-boo when reaches 8-9 months, and search for hidden objects at age 1 year.

Face recognition and what is known as “theory of mind” are impaired (Baron Cohen et. al 1995). During the first two years of life, the way the non-autistics perceive the form of objects changes (Philip, 1995; p. 161). Toddlers prefer to look at human faces rather than into objects. This preference is characteristic of infants only 5 days old.

It has been suggested that the problem underlying social impairment is lack of the in-built ability to recognize that other people have thoughts and feelings. Failure to respond to their parents’ voices and to respond to their name is obvious. As a result, parents may be concerned initially that the child is deaf.
An early diagnostic behavior is failure to engage in joint attention based on the ability to look where you are pointing (Baron-Cohen, 1996).

*Awareness and thinking abilities (Q5, Q8, Q9, Q11, Q13, Q15, Q16, and Q21)*

Baron-Cohen and colleagues (1996, 1992) have established that the absence of symbolic play in toddlers is highly predictive of the later diagnosis of autism. Therefore, screening for the presence of symbolic play is a key component of the routine assessment of well toddlers. Impairment in abstract and symbolic thinking is apparent. Inability to play imaginatively with objects or toys or with other children or adults is an outward manifestation of autism. Lack of varied, spontaneous make-believe play or social imitative play appropriate to developmental level was the feature of those autistics.

The absence of normal pretend play indicates the need for referral of specialized developmental assessment for autism and other developmental disabilities. Odd play may take the form of interest in parts of objects instead of functional uses of the whole object. For example, an autistic may enjoy repeatedly spinning a wheel of a car instead of moving the entire car on the ground in a functional manner. A tendency to select for attention minor or trivial aspects of things in the environment instead of an imaginative understanding of the meaning of the whole scene was also often found.

Bizarre responses to auditory stimuli are present as either a lack of responsiveness or an exaggerated reaction to auditory stimuli, possibly due to sound sensitivity. Unusual responses to sensory information such as loud noises, and lights are also common. Many researches suspect that these sensory processing difficulties are the cause of some of the more detrimental or harmful autistic behaviors, such as self-abuse, and tantrums (Irven, 1997).

Sensory-motor problems are a defining characteristic of autism excessive mouthing of objects, and delayed responses to name.
Movement abilities (Q1, Q3, Q8, and Q17)

Another psychobehavioral diagnostic characteristic of autism is the presence of repetitive, stereotyped activities and the need for sameness. Arm flapping, abnormal posture, jumping, hand-finger mannerisms, circling or spinning, rocking, toe walking, and other preservative, repetitive or stereotyped movements are among the diagnostic criteria. The toddlers may insist on the performance of particular routines, as climbing stairs or being swung by parents repeatedly.

Complex stereotyped activities involving objects include intense attachment to particular objects for no apparent purpose. Some routines include repetition of a sequence of odd bodily movements. Repetitive play skills are generally evident.
The minimum score was found to be 26, the maximum score 42, the mean or the arithmetic average of the group of scores 39.42, and the standard deviation 3.83. The tool scoring levels were as follows: High risk = more than 43.47, Medium risk = 36.83-43.46, and Low risk = less than 36.82.

The tool’s scoring was changed into 3 scales or levels from that of the original M-CHAT. Each level represents the probability of developing autism or suspecting to be autistic. Level (1) named as High Risk and Level (2) as Medium Risk which indicates that the toddler encounters signs of autism and needs to be referred to a diagnostic multidisciplinary team. Level (3) named as Low Risk illustrates that the toddler needs to be screened once more after a period of time.

Yes, question was given the value of 2, whereas no question was given the value 1, which means that if the toddler answered all questions “yes” he/she will gain a score value 44 (which indicates the likelihood and possibility of being autistic), and if answered all questions “no” he/she will gain 22, which indicates no existence of autism but. for more assurance toddlers should be retested again after a period of time.
Table (7): T-Test for two independent samples to assess whether the sex in the 2 groups of toddlers (autistic and non-autistic) differ in their means

<table>
<thead>
<tr>
<th>Groups compared</th>
<th>Sample size</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>df</th>
<th>t</th>
<th>Sig. (2-tailed)</th>
<th>Inference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>65</td>
<td>38.68</td>
<td>4.65</td>
<td>98</td>
<td>2.23</td>
<td>0.02</td>
<td>Difference exist between the 2 groups, sig.=0.05 (M-</td>
</tr>
<tr>
<td>Females</td>
<td>35</td>
<td>40.45</td>
<td>0.70</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The table above shows that the mean of males was 38.68 and of females was 40.45. The standard deviation of males and females was 4.65 and 0.70 respectively. Degree of freedom was found to be 98, while the t value was 2.23. Thus, the inferential statistics shows that there is difference between both sexes (males & females), with sig. = 0.05. This would suggest that, while females are less likely to develop autism, when they do they are more severely impaired. The symptoms may appear in any combination at any severity, so two toddlers with the same diagnosis may differ greatly in skills and behavior. Wing (1981: pp. 129-137) has set a theory that is based on evidence that, in the general population, females have better verbal skills, while male excel in visio-spatial tasks. There may be a neurological basis for this, so that autism can be interpreted as exaggeration of “normal” sex differences. But environmental and social factors may also play a part in sex differences in ability, which means that no direct correlation can be drawn between the poorer verbal skills of males and the higher incidence of autism in males.
Table (8): Descriptive statistics of M-CHAT for males

<table>
<thead>
<tr>
<th>Sample size</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>High risk</th>
<th>Medium risk</th>
<th>Low risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>65</td>
<td>26</td>
<td>42</td>
<td>38.8</td>
<td>4.62</td>
<td>More than 43.14</td>
<td>34.13-43.13</td>
<td>Less than 34.12</td>
</tr>
</tbody>
</table>

When comparing males and females’ responses it was found that differences exist. Thus, the descriptive statistics of M-CHAT for males clearly shows that the males whom were 65 had a minimum value of 26, maximum value of 42, mean of 38.8, and standard deviation 4.62. Accordingly the scales of scoring were as follows: Level (1) = More than 43.14, Level (2) = 34.13-43.13, and Level (3) = Less than 34.12. This result may be due to the fact that males are usually less severely impaired.
Table (9): Descriptive statistics of M-CHAT for females

<table>
<thead>
<tr>
<th>Sample size</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>High risk</th>
<th>Medium risk</th>
<th>Low risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>35</td>
<td>39</td>
<td>42</td>
<td>40.45</td>
<td>0.70</td>
<td>More than 41.16</td>
<td>39.23-41.15</td>
<td>Less than 39.22</td>
</tr>
</tbody>
</table>

Descriptive statistics of M-CHAT for 35 females revealed that their minimum value was 39, maximum value 42, mean 40.45, and standard deviation 0.70. Accordingly, the scales of scoring were as follows: Level (1) = More than 41.16, Level (2) = 39.23-41.15, and Level (3) = Less than 39.22. This result may be due to the fact that females are usually severely impaired when they develop autism.
Table (10): Analysis of variance - (ANOVA) to assess whether there is difference in the M-CHAT due to age

<table>
<thead>
<tr>
<th>Source of variance</th>
<th>Sum of squares</th>
<th>Mean squares</th>
<th>Degree of freedom</th>
<th>f</th>
<th>Sig.</th>
<th>Inference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>35.68</td>
<td>17.84</td>
<td>2</td>
<td>0.33</td>
<td>0.71</td>
<td>Difference due to age do not exist between the 2 groups, sig.=0.05</td>
</tr>
<tr>
<td>Within groups</td>
<td>10342.42</td>
<td>52.76</td>
<td>196</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>10378.11</td>
<td>52.76</td>
<td>198</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Differences due to age factor between males and females (between and within groups) did not exist. This may be due to the fact that sexes do not differ in their developmental phases during their first 3 years of life.

Through intense study of the results obtained, a conclusion and several recommendations were reached, and discussed in the next chapter.
Conclusion

The adapted Modified Checklist for Autism in Toddlers proved to be valid and reliable in detecting autistic sign in Sudanese toddlers with age ranging between 18 – 36 months. In addition, it showed its easiness in administration and scoring out. Moreover, it is never considered to be expensive or time consuming.
Heading the list of universal goals of parents is the survival and health of their children. To go about their everyday lives they do not, of course, have to have scientific knowledge about autism, but they do need what is called a folk psychology, a set of beliefs that they can use to understand, interpret, and predict their own and other, people’s thoughts, beliefs and actions. Usually parents, caregivers, and guardians are the first to note symptoms as early as infancy. “Many parents are misled by interpreting the delays or behavioral deviation their child exhibits” (cando.com/uci/ssi2000/savants.html). For they report that their child had normal social and language development but subsequently lost language and withdrew from social interaction. They may recall a major event preceding the change, such as the birth of a sibling, the death of a grandparent, or a physical illness, but it is unclear whether the child was truly unimpaired prior to the event, (ibid). “As infants, autistic children may be content to lie in their cribs or floor mats by themselves for hours without crying or making demand on parents, who feel initially that they have a good, easy-to-care-for baby. Other infants may be irritable and cry frequently” (Campell and Shay, 1999).

Thus, it is important to make sure children have attained developmental milestones. If a child misses, the milestones, it might be the first indication of possible autism or any other disability. This enables to identify and recognize if there is a problem somewhere.

The central dilemma for the pediatrician who screens patients is that identification must precede the provision of services, and the act of identifying a child as one who needs a comprehensive evaluation for developmental disabilities provokes anxiety in parents. This concern may create a tendency to identify only markedly delayed children, denying other children potential access to needed care.

Problems encountered
The research process was full of complexity and difficulties, due to being carried out with human beings. There was a great difficulty in finding and reaching more than 100 autistic toddlers mothers in Sudan; probably because they were not located in a certain special education center or institute, plus stigma and not willing to show up. In addition, time and financial constrains regarding the usage of online chatting with those Sudanese mothers whom were living abroad. The researcher was faced by a variety of obstacles that delayed the progression of the research for a while, however fortunately, it mobilized once more, and these include:

- Limited cooperation of experts
- Limited cooperation of toddlers' families
- Limited cooperation of special education centers
- Time constraints
- Financial constraints

**Recommendations**

1) Increase parents' awareness about childhood development, early warning signs of autism and other developmental disorders through educational seminars, awareness meetings, and distribution of enlightening sheets and materials in maternity hospitals, vaccination centers, and clinics. T.V. and radio programs must be more effectual and focus on autism.

2) It is recommended that screening should be repeated at various age levels when concerns for autism persist i.e. periodic health examinations are recommended for they provide specific opportunities for routine developmental surveillance in young children. The periodic exams by the M-CHAT are required at 9, 18, and 24, 30 months for they are particularly useful in providing information about possible autism, since characteristics of autism often begin to emerge during the second year of life. Moreover, not all autistics can be identified early, because the time of onset and severity of symptoms varies.
3) Medical care is needed whenever an infant or toddler exhibits any unusual behaviors for a day or two after behaving completely normally, it probably means that he/she is coming down with a minor illness, does not feel well, or is tired or under some other kind of stress. However, if the child has always had any of these characteristics, or the characteristic(s) continues over a period of time, a visit to the pediatrician is necessary.

4) During these exams, parent reports about their child’s behaviors should be considered for they may provide useful clues to help identify concerns about possible developmental problems, including autism. Medical experts should listen carefully to parental concerns and observations about the child's development.

5) An expert diagnostic team should have the responsibility of thoroughly evaluating the child, assessing the child’s unique strengths and weaknesses, and determining a formal diagnosis. The team should then meet with the parents to explain the results of the evaluation, in order to join forces with them to refer toddlers to early intervention services. Early intervention services would be much more effective when the family works closely with service providers and their toddler.

6) Siblings of children with autism should be carefully monitored for acquisition of social, communication, and play skills, and the occurrence of maladaptive behaviors.

7) It is very important to carry out well-child visits, which are medical evaluation of a child who is not sick. These visits monitor the child's growth, development, and screen for any childhood conditions that may not be noticeable yet. Use of a combination of clinical judgment, standardized screening tools, and listening to the parents concerns to identify those with developmental delays would be very effectual and with great value. For there is no 'medical test' that can give a clear diagnosis.
8) Special education centers should never diagnose a child as autistic unless referred to a multidisciplinary team of experts. For this evokes many risks and hinders the child’s as well as his/her family life.

**Future studies recommended**

The researcher suggests the following:

1. Adaptation and adjustment of other screening tools such as ABC, ADI-R, CARS, and PL-ADOS to provide more screening tools.
2. Adaptation of High functioning autism (HFA) screening tools for they are missed and uneasily recognized.
3. Introduction of a checklist concerning normal growth and developmental milestones from birth to 36 months could contribute a lot in following toddlers as they grow up, and make parents realize when a toddler misses one or two very early. Thus, refer the toddler to a pediatrician.
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الرسائل الجامعية

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Appendices

Appendix (1)

Checklist for autism in toddlers (CHAT)
Autism screening at 18-24 months of age

Child’s name:________ Date of birth:_________ Age:______ Date_________

Section A: Ask parent

1. Does your child enjoy being swung, bounced on your knee, etc? YES NO
2. Does your child take an interest in other children? YES NO
3. Does your child like climbing on things, such as upstairs? YES NO
4. Does your child enjoy playing peek-a-boo/hide-and-seek? YES NO
5. Does your child ever PRETEND, for example, to make a cup of tea? YES NO
6. Does your child ever use his/her index finger to point to, to ASK for something? YES NO
7. Does your child ever use his/her index finger to point to, to indicate INTEREST in something? YES NO
8. Can your child play properly with small toys (e.g. cars or bricks) without just mouthing, fiddling, or dropping them? YES NO
9. Does your child ever bring objects over to you (parent) to SHOW you something? YES NO

Section B: Physician or health care provider observation

1. During the appointment, has the child made eye contact with you? YES NO
2. Get child’s attention, point across the room at an interesting object and say “oh look! There’s a (name of toy)” watch child’s face. Does he look across to see what you are pointing at? YES NO
3. Get child’s attention, then give child a miniature toy cup and teapot and say “could you make a cup of tea?” does the child pretend to pour out tea, drink it, etc? YES NO
4. Say to the child “where’s the light?”, or “show me the light”. Does the child POINT with his/her index finger at the light? YES NO
5. Can the child build a tower of cubes? (If so how many?) YES NO (Number of cubes_________________)  
B2: to record YES on this item, ensure the child has not simply looked at your hand, but has actually looked at the object you are pointing at.
B3: If you can elicit an example of pretending in some other game, score a YES on this item.
B4 Repeat with “where’s the teddy?” or some other unreachable object, if child does not understand the word light. To record YES on this item, the child must have looked up at you face around the time of pointing.

Appendix (2)
Permission given to use the M-CHAT
### Appendix (3) The original version of the Modified Checklist for autism in toddlers

**Instructions**

Please fill out the following about how your child usually is. Please try to answer every question. If the behavior is rare (e.g. you have seen it once or twice), please answer as if the child does not do it.

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Yes</th>
<th>No</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Does your child enjoy being swung, bounced on your knee, etc.?</td>
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<td>2</td>
<td>Does your child take an interest in other children?</td>
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<td>3</td>
<td>Does your child like climbing on things, such as up stairs?</td>
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<td>Does your child enjoy playing peek-a-boo/hide-and-seek?</td>
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<td>5</td>
<td>Does your child ever pretend, for example, to talk on the phone or take care of dolls, or pretend other things?</td>
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<tr>
<td>6</td>
<td>Does your child ever use his/her index finger to point, to ask for something?</td>
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<tr>
<td>7</td>
<td>Does your child ever use his/her index finger to point, to indicate interest in something?</td>
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</tr>
<tr>
<td>8</td>
<td>Can your child play properly with small toys (e.g. cars or bricks) without just mouthing, fiddling, or dropping them?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>9</td>
<td>Does your child ever bring objects over to you (parent) to show you something?</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>10</td>
<td>Does your child look you in the eye for more than a second or two?</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>11</td>
<td>Does your child ever seem oversensitive to noise? (e.g., plugging ears)</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>12</td>
<td>Does your child smile in response to your face or your smile?</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>13</td>
<td>Does your child imitate you? (e.g., you make a face-will your child imitate it?)</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>14</td>
<td>Does your child respond to his/her name when you call?</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>15</td>
<td>If you point at a toy across the room, does your child look at it?</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>16</td>
<td>Does your child walk?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>17</td>
<td>Does your child look at things you are looking at?</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>18</td>
<td>Does your child make unusual finger movements near his/her face?</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>19</td>
<td>Does your child try to attract your attention to his/her own activity?</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>20</td>
<td>Have you ever wondered if your child is deaf?</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>21</td>
<td>Does your child understand what people say?</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>22</td>
<td>Does your child sometimes stare at nothing or wander with no purpose?</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>23</td>
<td>Does your child look at your face to check your reaction when faced with something unfamiliar?</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
Appendix (4)

The version applied after reliability and validity

1. Child’s name---------------------------------------------
2. Child’s age---------------------------------------------
3. Child’s sex --------------------------------------------

Please fill out the following about how your child usually is. Please try to answer every question. If the behavior is rare (e.g. you have seen it once or twice), please answer as if the child does not do it.

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| 2      | ﻋﻥ ﻋﻥ ﺍﻹﺠﺎﺒﺔ ﺍﻟﺭﺠﺎﺀ ﻋﻥ ﺍﻹﺠﺎﺒﺔ | 2
| 3      | ﻋﻥ ﻋﻥ ﺍﻹﺠﺎﺒﺔ ﺍﻟﺭﺠﺎﺀ ﻋﻥ ﺍﻹﺠﺎﺒﺔ | 3
| 4      | ﻋﻥ ﻋﻥ ﺍﻹﺠﺎﺒﺔ ﺍﻟﺭﺠﺎﺀ ﻋﻥ ﺍﻹﺠﺎﺒﺔ | 4
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| 6      | ﻋﻥ ﻋﻥ ﺍﻹﺠﺎﺒﺔ ﺍﻟﺭﺠﺎﺀ ﻋﻥ ﺍﻹﺠﺎﺒﺔ | 6
| 7      | ﻋﻥ ﻋﻥ ﺍﻹﺠﺎﺒﺔ ﺍﻟﺭﺠﺎﺀ ﻋﻥ ﺍﻹﺠﺎﺒﺔ | 7
| 8      | ﻋﻥ ﻋﻥ ﺍﻹﺠﺎﺒﺔ ﺍﻟﺭﺠﺎﺀ ﻋﻥ ﺍﻹﺠﺎﺒﺔ | 8
| 9      | ﻋﻥ ﻋﻥ ﺍﻹﺠﺎﺒﺔ ﺍﻟﺭﺠﺎﺀ ﻋﻥ ﺍﻹﺠﺎﺒﺔ | 9
| 10     | ﻋﻥ ﻋﻥ ﺍﻹﺠﺎﺒﺔ ﺍﻟﺭﺠﺎﺀ ﻋﻥ ﺍﻹﺠﺎﺒﺔ | 10
| 11     | ﻋﻥ ﻋﻥ ﺍﻹﺠﺎﺒﺔ ﺍﻟﺭﺠﺎﺀ ﻋﻥ ﺍﻹﺠﺎﺒﺔ | 11
| 12     | ﻋﻥ ﻋﻥ ﺍﻹﺠﺎﺒﺔ ﺍﻟﺭﺠﺎﺀ ﻋﻥ ﺍﻹﺠﺎﺒﺔ | 12
| 13     | ﻋﻥ ﻋﻥ ﺍﻹﺠﺎﺒﺔ ﺍﻟﺭﺠﺎﺀ ﻋﻥ ﺍﻹﺠﺎﺒة | 13
| 14     | ﻋﻥ ﻋﻥ ﺍﻹﺠﺎﺒة ﺍﻟﺭﺠﺎﺀ ﻋﻥ ﺍﻹﺠﺎﺒة | 14
| 15     | ﻋ่น ﻋakukan ﻋنان ﺍﻹﺠابة | 15
| 16     | ﻋنان ﻋakukan ﻋنان ﺍﻹﺠابة | 16
| 17     | ﻋنان ﻋakukan ﻋنان ﺍﻹﺠابة | 17
| 18     | ﻋنان ﻋakukan ﻋنان ﺍﻹﺠابة | 18
| 19     | ﻋنان ﻋakukan ﻋنان ﺍﻹﺠابة | 19
| 20     | ﻋنان ﻋakukan ﻋنان ﺍﻹﺠابة | 20
| 21     | ﻋنان ﻋakukan ﻋنان ﺍﻹﺠابة | 21
| 22     | ﻋنان ﻋakukan ﻋنان ﺍﻹﺠابة | 22
Appendix (6) Version after revision of committee of experts and reliability statistics

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</tbody>
</table>
Appendix (7)

Letter submitted for the committee members

بسم الله الرحمن الرحيم
جامعة الخرطوم
كلية الدراسات العليا
كلية الآداب
شعبة علم النفس

................................... ۰۰۰۰۰ ۰۰۰۰

السلام عليكم ورحمة الله وبركاته

كؤومة مجيدًا زانا ............ لفّاجفًا جاجيّ خججودًا كمجردًا ۰۰۰۰

غمة لجقًا نجقًا تجانجًا تجوعًا تجوعًا أغلقني طق في ت będو ۰۰۰۰ ۰۰۰۰ ۰۰۰۰ ۰۰۰۰ ۰۰۰۰

. لفّاجفًا جاجيّ خججودًا كمجردًا ۰۰۰۰ ۰۰۰۰ ۰۰۰۰ ۰۰۰۰ ۰۰۰۰ ۰۰۰۰ ۰۰۰۰ ۰۰۰۰ ۰۰۰۰ ۰۰۰۰

. كؤومة مجيدًا زانا

. كؤومة مجيدًا زانا

. كؤومة مجيدًا زانا
Appendix (8)

Committee of English/Arabic experts
1. Uz. Ahmed Bala – Ahfad University for Women
2. Uz. Abd Al Mahmoud Bakhiet – Cambridge center
3. Uz. Nagal Bab Alkhier – Ahfad University for Women
4. Dr. Amira Elfeel – Ahfad University for Women
5. Uz. Al Sir Doleeb – Ahfad University for Women

Committee of psychology/psychiatry experts
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7. Dr. Khalid Alkurdi – Alnileen University
8. Dr. Abd Al Bagi Dafa Allah - Khartoum University
9. Dr. Kabashore Kuku – University of Khartoum
10. Dr. Fatheya Shabo – psychiatrist
11. Dr. Abd Al Razag Alfaki – psychiatrist
12. Dr. Layla Abd Al Rahman - Khartoum University
13. Dr. Suad Musa - Ahfad University for Women
14. Dr. Alawey Ibrahim – Ahfad University for Women
15. Dr. Abd Al Ghani Abasher – psychiatrist
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Appendix (9)

Figure 1: How to integrate developmental surveillance and screening into well-child visits

- **Pediatric patient at well-child visit**
  - Ask parents about child.
  - Observe child
  - Does observation, parental interview, or developmental history suggest risk?
    - Yes
      - Administer screening tool(s).
      - Are screening results positive; of concern?
        - Yes
          - Make referrals for developmental and medical evaluations and refer to early intervention programs with parental involvement.
        - No
          - Schedule early return visit.
    - No
      - Schedule next well-child visit.
  - Is this a 9-, 18-, or 30-month visit?
    - Yes
      - Administer screening tool(s).
    - No
      - Schedule next well-child visit.