Screening of cognitive impairments among children with ASD: a pilot study

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Abstract: Standardized screening and assessment instruments have been shown to be useful and necessary tools for making appropriate referrals for diagnosis of autism spectrum disorder (ASD). The purpose of this study was to determine whether the "Ages & Stages Questionnaire (ASQ) is an effective tool for screening cognitive impairment among children with ASD and whether there was a significant difference between the answers provided by parents/guardians and therapists. The ASQ 3 (Problem Solving), which comprises questions regarding cognitive skills, was used. The sample comprised 14 male and female children aged between 24 and 71 months diagnosed with ASD. The descriptive and statistical analysis was conducted and no significant differences between groups were identified. The ASQ was able to identify children with cognitive impairment and was shown to be a quick, low-cost, and easy-to-use tool. These are considered features of an ideal questionnaire for use as a screening instrument in a primary health care setting.

Keywords: autistic disorder; cognition; diagnosis; early detection; speech therapy; child.

RASTREIO DE ALTERAÇÕES COGNITIVAS EM CRIANÇAS COM TEA: ESTUDO PILOTO

Resumo: Escalas e instrumentos de triagem padronizados vêm se mostrando ferramentas úteis e necessárias. Desta forma, o objetivo deste estudo foi verificar se o Ages & Stages Questionnaires (ASQ) é eficaz para rastrear alterações cognitivas em crianças com Transtorno do Espectro do Autismo (TEA), e se existem diferenças entre as respostas dadas pelos cuidadores e terapeutas da criança. Foi utilizado o teste ASQ-3 "Resolução de Problema", com perguntas sobre habilidades cognitivas. Os participantes foram 14 sujeitos, dos gêneros feminino e masculino e idade entre 48 e 71 meses com diagnóstico de TEA. Foi realizada a análise descritiva e estatística dos dados e não foram identificadas diferenças significativas entre grupos. O ASQ foi capaz de identificar as crianças com comprometimento cognitivo e mostrou-se ser um instrumento de fácil aplicação, rápido no preenchimento e com baixo custo, atributos ideais para uma ferramenta de avaliação em cuidados de saúde primários.

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Palavras-chave: transtorno autístico; cognição; diagnóstico; testes imediatos; fonoaudiologia; criança.

INVESTIGACIÓN DEL DÉFICIT COGNITIVO EN LOS NIÑOS CON TEA: UN ESTUDIO PILOTO

Resumen: Escalas y instrumentos de selección estandarizados se han demonstrado hierramientas útiles y necesarias para diagnóstico. El objectivo del estudio fue verificar si el teste Ages & Stages Questionnaires (ASQ) és eficaz para mapear alteraciones cognitivas en niños con Transtornos del Espectro del Autismo (TEA), y también si hay importantes diferencias en las respuestas de los responsables legales de los niños y las respuestas de las terapeutas. Fue utilizado el teste ASQ-3 "Resolución de problema". Fueran estudiados 14 indíviduos, de los dos gêneros, en el grupo de edad entre los 48 y 71 meses con diagonóstico del TEA. Fue hecha la analysis descritiva y estatistica de los datos y fue capable de de identificar los niños que apresentan alteraciones cognitivas. ASQ se mostró un instrumento de fácil aplicación, rápido y poco costoso, características consideradas ideales para que sea un instrumento de selección a se utilizar en la Atención Básica.

Palabras clave: transtorno autístico, cognición, diagnóstico; pruebas en el punto de atención; fonoaudiología; niño.

Introduction

Autism is an invasive developmental disorder characterized by severe difficulties in social interaction and communication and repetitive and stereotyped behaviors (Volkmar & Pauls, 2003; Fernandes, 2003). The clinical manifestations of autism and their severity vary widely, and its diagnosis must meet at least six behavioral criteria: one from each of the areas of impaired behaviors (Klin, 2006; Reznik, Baranek, Reavis, Watson, & Crais, 2007). There are signs of autism in young children since the disorder involve symptoms that typically appear in the first two years of life (Machado, Palladino, & Cunha, 2014; Matson, Wilkins, & González, 2008).

The American Psychiatric Association recently adopted the term Autism Spectrum Disorder (ASD) to include autism, Asperger syndrome, and invasive developmental disorders not otherwise specified (APA, 2013).

Studies recently conducted in the United States suggest an increase in the incidence of autism among children, with the disorder now affecting one in 68 children, which is equivalent to 1.5% of the overall population (CDC, 2014). These figures underscore the importance of providing early diagnosis and treatment services and also emphasize the urgent need to develop early intervention models and identify the factors that influence these processes (Amato et al., 2011). Early diagnosis is also important because it provides parents with the knowledge to make informed decisions about future pregnancies and provides the basis for genetic counseling, which involves the parental discussion of concerns and provision of psychological support (APA, 2013).

Given the increase in the prevalence of ASD, Brazilian legislation provides that early detection of ASD is part of the government's responsibility to provide comprehensive health care services following the principles of primary health care,

which include disease prevention and health promotion and protection (Ministério da Saúde, 2015).

Children with autism have specific problems that apply to cognitive mechanisms necessary for the representation of mental states, resulting in difficulties with patterns of social interaction. Such difficulties can directly alter symbolic play patterns, creativity, originality, and the pragmatic ability to which this is a prerequisite skill (Adamson, McArthur, Marko, Dunbar, & Bakman, 2001). Cognitive deficits also alter aspects of language and central coding processes (Fernandes, 2000).

The availability of specialist assessments is often limited due to the lack of specialists, particularly in the public health system. As a result, there is an urgent need to develop cognitive screening methods adapted to the limitations of the public health system (Jacinto, 2008).

It is important to note that this type of intervention is supported by neuroscience and may offer a more cost-effective way to deliver services to individuals with ASD. The treatment of children with autism depends on an established diagnosis. Although specific assessment instruments are available, the identification of risks may be facilitated by screening, which allows for the rapid assessment of large numbers of infants to determine those who would benefit from a more comprehensive assessment (LoVullo & Matson, 2012).

Scales and standardized screening and assessment instruments have been shown to be useful and necessary tools for making appropriate referrals for diagnosis of ASD (Machado et al., 2014). In this respect, screening instruments should be quick, low cost, and relatively easy to administer (Westerlund, Berglund, & Eriksson, 2006). Screening can be undertaken by health professionals, while clinical assessments conducted by specialist teams are time-consuming and expensive. One alternative is the collection of information from parents using standardized instruments. Parents are present during clinical visits and often observe behaviors that may otherwise go undetected in a brief clinical encounter (Veldhuizen, Clinton, Rodriguez, Wade, & Caimey, 2015).

The Ages & Stages Questionnaires (ASQ), developed by the American researcher Diane Bricker and collaborators (Squires & Bricker, 2009), is one of the most widely-used parent-completed questionnaires. It is organized into ages in months and questions are divided into domains of child development: communication, gross motor skills, fine motor skills, problem-solving, personal-social skills, and general questions. Parents mark the answers as "yes" (scored as 10), "sometimes" (scored as 5), or "not yet" (scored as zero). Total scores are then compared to the cutoff established by Bricker to determine appropriate follow-up.

It is important to note that the ASQ was designed to be a general development tool and thus is by no means an ASD-specific screener. However, its content includes questions regarding communication, social interaction, and cognition, which provide for the screening of the characteristics of ASD.

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This aimed at determining whether the Ages & Stages Questionnaires is a useful tool for screening cognitive impairment among children with autism spectrum disorder and whether there was a significant difference between the answers given by parents/guardians and those provided by therapists.

Methods

The present study was approved by the Research Commission of the Department of Physiotherapy, Speech Therapy and Occupational Therapy and by the Research Ethics Committee of the Faculty of Medicine at the University of São Paulo (FMUSP, acronym in Portuguese) (application N° 226/10).

Material

This study used questions from the ASQ 3 (Problem Solving), which assesses cognition. The six questions for each age group were translated into Portuguese. The children's parents/guardians were informed about study objectives and procedures and that their participation would not involve any form of risk or discomfort.

Samples

The study sample comprised fourteen male and female children aged between 24 months (2 years) and 71 months (5 years and 11 months) receiving treatment at the Laboratory for the Study of Speech Therapy in Autism Spectrum Disorder (Laboratório de Investigação Fonoaudiológica nos Distúrbios do Espectro do Autismo – LIF-DEA) at the University of São Paulo. The following inclusion criteria were adopted: children receiving treatment at the LIF-DEA; children diagnosed with autism spectrum disorder or currently undergoing diagnostic procedures, and children's parents/guardians signed an informed consent form.

Procedures

The therapists responsible for each child responded the six questions based on their observations of the child's cognitive performance during therapy. Subsequently, the child's parents/guardians answered the questionnaire under the guidance of the therapists based upon their own perceptions of their child's cognitive performance.

Statistical Analysis

Descriptive analysis was conducted by calculating absolute and relative frequencies, measures of central tendency (mean and median), and dispersion (standard deviation,

minimum and maximum values). The Student's t-test for was used to test for the homogeneity of responses using a 5% significance level (p ≤ 0.05).

Results

The ASQ was shown to be quick, low cost and easy to use, corroborating the hypothesis that it possesses the features of an ideal questionnaire for use as a screening instrument in a primary health care setting.

About the sensitivity of the questionnaire, the findings show that the ASQ is capable of identifying children who display cognitive deficits. The results based on the answers of both parents/guardians and therapists show that the cognitive performance of children was below that expected for their age in 86% of the sample (Table 1); which was to be expected given that cognitive deficit is one of the diagnostic criteria for autism.

Table 1. Percentage of participants who displayed adequate cognitive performance.
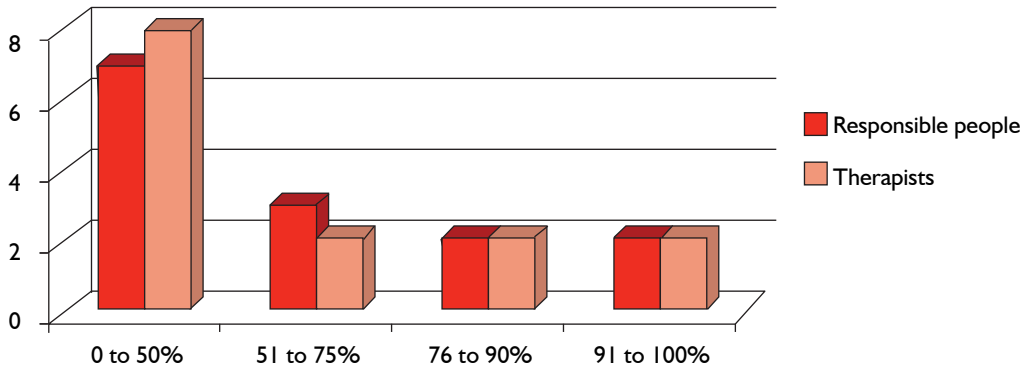
	Adequate			
	Therapists		Parents	
	YES	NO	YES	NO
	2	12	2	12
	14%	86%	14%	86%
Student t-test	p-value < 0.001*		p- value < 0.001*	

* 95% confidence interval

Source: The authors.

Moreover, the cognitive performance of those children who displayed cognitive deficit was well below that expected, with half achieving less than 50% of the expected score for their age (Graph 1).

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Graph 1. Percentage of performance cutoff score achieved by children.

Source: The authors.

Only 14% of the children demonstrated adequate cognitive performance. Of this group, only one displayed adequate performance when considering the answers of both parents/guardians and therapists. It is important to note that this child met the diagnostic criteria for Asperger syndrome, which does not involve cognitive impairment.

The comparison of the average scores obtained by the children based on the answers given by both parents/guardians and therapists (Table 2) shows that there was no significant difference between the assessments (p-value = 0.40). This fact demonstrates that the majority of parents/guardians can judge their children's cognitive performance, thus confirming the reliability of their responses to the questionnaires questions.

Table 2. Comparison between answers given by parents and therapists.

Age	Average Score Therapists	Average Score Parents
2 years	30	25
3 years and 6 months	20	20
4 years	11	10

(to be continued)

Table 2. Comparison between answers given by parents and therapists.

Age	Average Score Therapists	Average Score Parents
5 years	15	16
Student t-test	p-value 0.4*	

* 95% confidence interval

Source: The authors.

Discussion

Often, concerns about their child's language development mean that parents first seek professional advice from a speech therapist before undertaking a diagnostic assessment for ASD, demonstrating the importance of speech therapy interventions for the early detection of this disorder (Machado et al., 2014). Consequently, speech therapists should be well versed in screening and assessment methods that are capable of detecting the characteristics of ASD. Based on its success in detecting cognitive deficit in the study sample, our findings show that the ASQ has the potential to be a useful instrument for speech therapists.

The fact that the questionnaire was able to detect that 86% of the children displayed cognitive deficits corroborates the findings of other studies that show that the diagnosis of autism must show impairment in three areas, one of which is the area of cognition (Fernandes, 2006; Reznick et al., 2007).

The findings also show that the responses provided by the children's parents/guardians were reliable, given that there was no significant difference between their answers and those given by the therapists. Studies show that to ensure the effective use of answers provided by parents for assessing child behavior, the advantages and disadvantages of this technique must be recognized. Advantages include the fact that parents are in a naturally privileged position and are highly motivated observers of the behavior of their children. The majority of parents are in constant contact with their children through an array of activities and situations, which helps them to perceive practically all aspects of the behavior and emotions of their child. Another advantage of parent-reported techniques is that they involve the use of questionnaires, which can be conveniently administered in various contexts, including by e-mail (Reznik et al., 2007). On the other hand, researchers should pay careful attention to the behavior of parents in relation their children's cognitive performance, since they tend to underestimate their cognitive deficits.

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The present study has two main limitations: the small sample size and the fact that no comparison was made between the ASQ and other assessment instruments. It is therefore suggested that further research should be conducted to compare the ASQ to other instruments, such as the social-cognitive performance assessment protocol.

The prevalence of ASD has increased in recent years, meaning that this problem is a growing public health concern. Since children with autism benefit from early intervention, early identification and diagnosis have become increasingly important, leading to the need for low-cost, easy-to-use screening instruments.

The findings of this study show that the ASQ possesses the features mentioned earlier and that it was capable of showing that children with ASD displayed cognitive performance below that expected at their age. Moreover, the study show that the ASQ is a useful parent-completed questionnaire, resulting in reliable answers regarding the actual cognitive performance of the respondents' children. We can, therefore, conclude that the ASQ can be used in conjunction with other instruments designed to support the successful screening of ASD among children to determine those who would benefit from a more comprehensive assessment.

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