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Psychometric properties and validation of Portuguese version of Ages & Stages Questionnaires (3rd edition): 9, 18 and 30 Questionnaires

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ABSTRACT

Background: The essential underlying foundations of Early Intervention (EI), in which parents/family play a critical role in their child's development, leads us to conclude that their contribution assessing early detection of problems is fundamental. The Ages & Stages Questionnaires (ASQ) is a standardized screening instrument that has been successfully studied in different countries and cultures.
Aims: Translate and study the psychometrics proprieties of the Portuguese version of the 9, 18 and 30 month questionnaires of the Ages and Stages Questionnaires, 3rd edition (ASQ-3).
Study design: Cross-sectional study.
Subjects: Validity and reliability were studied in a sample of 234 parents of children within 9, 18 and 30 months.
Results: The results indicated that the questionnaires had good internal consistency, strong agreement between observers and between observations with two weeks interval, and strong Pearson product–moment correlation coefficients between the overall and the total for each domain. The cutoff points (i.e. 2 standard deviations below the mean domain score), that identifies children who should receive further referral for more comprehensive assessment, were close to those determined in the original ASQ-3 psychometric studies. Cronbach's alpha ranging from .42 to .70 and Pearson's r values varies from .22 to .60.
Conclusions: Although some weaknesses were noted in psychometric qualities analysis, it can be concluded that the ASQ-PT of 9, 18 and 30 months of age fulfills the requirements of a screening tool validated for the Portuguese population.
Practice implications: To allow the early identification of children with developmental problems.

1. Introduction

The ability of the brain to rearrange or adjust decreases as skills become more and more complex. Over time, the brain eliminates circuits that are less used strengthening those used often. Since the brain is particularly responsive to experiences in early years, early intervention is a way to assure a positive development and good health throughout life [1,2]. Developmental delays can be silent and occur in infants that apparently are developing without problems.

Heckman [3] states that competence generates competence, and that, sooner the skills are acquired by the person the greater are the chances of achieving new skills. The investment return of policies based on the implementation of early intervention can be reflected in the future, at the personal level of higher education, higher rates of physical, mental well-being and higher wage gains, and also to society with lower rates of crime and delinquency, reducing public expenditure and higher tax revenues.

Currently a large percentage, 50% to 80%, of children with developmental delays is only detected after school entry, thereby missing the opportunity to achieve maximum outcomes in the preschool years [4–6]. This late referral may be due to the type of symptoms or to the cost and time-consuming nature of evaluations by professionals. Questionnaires completed by parents could be a viable alternative to professionals' assessments, thus decreasing the money spent and making them more economically efficient [7–12].

The American Academy of Pediatrics recommends using a valid and standardized developmental screening tool at 9, 18 and 30 months of age [12,13]. Developmental screening is mainly a preventive measure, that by using a brief, reliable and valid instrument, professionals can identify children who are at risk for developmental delay and need further evaluation [14–17]. It is important to implement formal and valid

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screening tools, not only for children with suspicions of developmental disabilities, as well as for children who have normal development, as a way to increase families' awareness about aspects of child development and behavior expected (1) [9,11,18,19]. In Portugal, legal changes led us to the implementation of the Decree-Law 281/2009 [20], which created the National Early Childhood Intervention System. The 4th Article sets the system goals, one of them is "detect and signalize all children at risk for changes or changes in functions and structures of the body or serious risk of developmental delay."

The Ages and Stages Questionnaires, Third Edition (ASQ-3) [21] is a developmental screening instrument composed of 21 questionnaires for children from the first month until five and half years of age. The parents or caregivers of infants (2, 4, 6 and 8 months), toddlers (9, 10, 12, 14, 16, 18, 20, 22, 24, 27, 30 and 33 months) and preschoolers (36, 42, 48, 54 and 60 months) observe their child's development in five domains, communication, gross motor, fine motor, problem solving and personal-social. They observe their child's skills and respond "yes", "sometimes" or "not yet" to six questions in each of the 5 domains.

Studies on the ASQ have been carried out in numerous countries, with overall positive results [22]. Some countries in which ASQ-3 studies were completed include: Norway [23], Brazil [24], United States of America [25], Chile [26], Peru [27], Netherlands [28], Australia [29], China [30] and India [31].

The aim of this study was to determine a reliable and valid instrument for the Portuguese population to enable the screening of children's development. This way, by ensuring the psychometric qualities of the 9, 18 and 30 questionnaires of the Portuguese version of the ASQ (ASQ-PT), we intended to contribute to the design and implementation of a screening system to answer the needs of the Portuguese population.

2. Methods

2.1. Participants

The present study was undertaken as a national validation study using a sample of the Portuguese population to find appropriate psychometric qualities of the ASQ-PT, namely reliability and validity. Data were collected from families with children from 9 + 1 months, 18 ± 1 months and 30 ± 1.5 months, enrolled in daycare and health care centers. Portuguese literacy parents, that completed at least elementary school, and who assented to take part, were invited to participate in the study.

Portuguese speaking parents and caregivers of children with 9, 18 and 30 months were recruited from health care and daycare centers. In each five regions, designated by the Nomenclature of Territorial Units for Statistics System II, a set of organizations, selected by convenience, were invited to participate in this study. It was guaranteed that these organizations properly represent the five regions, considering both rural and urban context and the different children ages. Organizations were initially contacted by phone, email or in person to verify if they were interested in taking part of the research. If they agreed, all parents/caregivers of 9, 18 and 30 month old children were invited to complete the questionnaires.

2.2. The ASQ-PT

The translation of 9, 18 and 30 month questionnaires of ASQ-3 to Portuguese was completed using the method of back translation after initial translation, considered the most appropriate with less likelihood of bias [32]. Each questionnaire was translated from English into Portuguese by two professionals (one Portuguese with fluent knowledge of English and another of English and Portuguese nationality, English teacher in Portugal). The Portuguese judge completed the translation and English judge participated in this stage as a consultant to clarify slight differences in the English language. Thereafter, a third judge, bilingual, proceeded to back-translation. In the end, the first two judges compared the original version and the Portuguese version, and identified differences that justified a meeting between the three judges. Changes were made in syntactic structure, which was characterized by removing particles or elements with redundant meaning, and culturally adapting some terms since they were not commonly used in Portuguese. Finally, a pretest of each age questionnaire was administered to verify the clarity, understanding, cultural relevance and adjustment of the words used.

2.3. Procedures

Data collection took place between May 2011 and June 2012. Study goals, including procedures were explained before the distribution of the questionnaires. An Excel database was established with the current date and the birthday of all children from the organizations that agreed to participate to automatically calculate the questionnaire delivered to each child. The questionnaires were sent by mail or hand-delivered and subsequently handed over to parents by the teachers of each preschool classroom or by nurses from the health centers. All parents and caregivers who participated in this study signed a consent form before completing the questionnaire. A personalized communication explaining that information would be kept confidential, the questionnaires were anonymous, and explaining the importance of early identification of developmental delays was used to increase the participant response rate. Twenty-five incomplete questionnaires were eliminated.

2.4. Statistical analysis

Data were stored in a database built in the Statistical Package for Social Science (SPSS®), conducting an analysis based on descriptive and inferential statistics. During this study, we analyzed the psychometric qualities of three questionnaires in the Portuguese version. Reliability analyses were used to measure the consistency or stability of the ASQ-3-PT, with internal consistency measured by Cronbach's alpha. Test–retest reliability was determined by a second administration of the same questionnaire to the same parents at a two-week time interval. Inter-observer of ASQ-PT was calculated by the comparing the questionnaires completed by a parent and by a professional on the same child. Both reliability tests used a convenience sample. Item means and standard deviations were calculated, as well as the item-total correlation (ITC). Validity was measured, using the Pearson product moment test and factor analysis (FA). The FA was calculated considering the principal components' analysis and varimax rotation limited to five factors, since this is the number of domains or areas observed in the ASQ. For the 30 items correlation coefficient equal or greater than .40 was accepted. Communalities, eigenvalues, and the total variance explained were also analyzed. Pearson product–moment correlation coefficients were calculated between each domain and domain score and the total score for each questionnaire. Mean scores and cutoff points for Portuguese population were generated for each domain and compared to the US normative sample. Finally, clinical validity was measured using comparative analyses between mean domain scores for children with and without risk for developmental delays.

3. Results

3.1. Descriptive analysis

Data from 234 ASQ-PT at 9, 18 and 30 months questionnaires were included in this study. The response rate was about 60%. The sample represents 1% of the Portuguese population corresponding to a margin of error of 6.5%.

Mothers corresponded to 80.3% of persons who completed the questionnaires. Table 1 summarizes demographic characteristics; only 15.0% of children were not enrolled from daycare. A high percentage of the