

# A mobile application to screen for autism in Arabic-speaking communities in Oman



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## Abstract

**Background** Epidemiological studies of autism spectrum disorders (ASDs) in Arab communities have usually shown lower prevalence than those from Western nations. In Oman, the ASD prevalence is estimated to be 0·14 per 1000 Omani children aged 0–14 years. Many factors contribute to this low estimate including lack of awareness, non-standardisation of diagnostic tools, and unequal distribution of services. This study aimed to develop and pilot a mobile application to provide families with a reliable and easy-to-use tool to screen their children for ASDs. Using culturally appropriate images, this mobile application also seeks to reduce ambiguity in the interpretation of the standard Modified Checklist for Autism in Toddlers (M-CHAT) screening tool that arises from language and cultural differences.

**Methods** Between December, 2013, and March, 2014, a team of software developers used an improved and validated version of the M-CHAT in Arabic to create the mobile application called “Autism Fingerprint”. The application uses animations and comparative images to demonstrate autistic and non-autistic behaviours. We customised images to Omani culture to reduce ambiguity and misunderstanding. In addition, the application includes general information about ASDs to increase awareness and knowledge. We conducted a validation study between March and October, 2014, with volunteers from Arabic-speaking countries. Through collaboration with the Oman Autism Association (the national autism support group), potential participants were approached during exhibitions and autism awareness activities. Validity was assessed by calculating sensitivity and specificity of the screening test. The gold standard was the confirmed diagnostic status as indicated in medical reports issued by specialised medical centres. The reliability was assessed by measuring the correlation coefficient of test-retest reliability.

**Findings** We included 130 participants in the validation study, of whom 65 (50%) were caretakers of children with a confirmed ASD and the rest were caretakers of children with typical development. Of the 65 confirmed cases of ASD, the mobile application identified 58 of these cases as high likelihood of ASD (positive), giving a sensitivity of 0·89. Of the 65 confirmed non-cases of ASD, the mobile application indicated 53 as low likelihood of ASD (negative), revealing a specificity of 0·82. The reliability assessment shows that the application had a high test-retest reliability (correlation coefficient,  $r=0·86$ ).

**Interpretation** We have developed a mobile application to screen for autism in Arabic-speaking populations that is both sensitive and specific. Future versions of the Autism Fingerprint application will have an option for English, be available for download on Apple iOS devices, and have the ability to directly send the results to a chosen physician. Effectiveness and validity will continue to be monitored, and any updates to the M-CHAT will be incorporated into future versions.

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## Declaration of interests

We declare no competing interests.

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