

Translation and Cultural Adaptation of the Ages and Stages Questionnaires (ASQ) Worldwide: A Scoping Review

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ABSTRACT: *Objective:* This scoping review aims to provide a data mapping and narrative synthesis of the available peer-reviewed scientific literature on the translation and cultural adaptation processes relative to the Ages and Stages Questionnaires (ASQ) as reported by the authors. It also seeks to paint an overall portrait of the implementation of the translated and culturally adapted ASQ worldwide. *Methods:* Articles published between 1995 and May 11, 2018, were identified via systematic searches of peer-reviewed literature carried out using CINAHL, Scopus, MEDLINE, Education Source, PsycINFO, and ERIC. The articles included in the qualitative synthesis were coded based on an extraction form developed for the study. *Results:* In the 46 articles surveyed, 37 different cultural adaptations were identified in 29 languages and 27 countries. Translations were included in 33 cultural adaptations, and language modifications were reported in 18 adaptations. The forward-backward translation method was reported in 25 cases. The authors declared having made cultural content, language, visual, and/or conceptual modifications in 26 adaptations. Cultural content modifications were reported in 24 adaptations. At least one method (pilot study, individual interview, survey or focus group with respondents) was reported in 24 adaptations. *Conclusion:* Cultural modifications were relatively minor and were, in general, made to establish equivalence with the source version. As well, the processes used to translate and culturally adapt the ASQ varied widely based on the types of methods. Additional work should be conducted to document the process of this crucial phase.

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Early identification of developmental delays and interventions in the first 5 years of life has had multiple favorable impacts on children's overall development, academic success, health, and general well-being.^{1–3} The American Academy of Pediatrics (AAP) recommends the developmental surveillance of children and specifies that every child should be regularly screened for developmental delays at 9, 18, and 30 months.⁴ While most health-related screening measures were developed in English, many health and social care systems, practitioners, and researchers require developmental screening tools in multiple languages to

accommodate different populations.^{5,6} Since developing a new instrument calls for human resources, time, and money, a common approach is to translate and culturally adapt well-established measures.^{6–8}

Initially developed in the United States, the Ages and Stages Questionnaires (ASQ)^{9–11} have been translated and adapted into several languages and cultures for their intended purpose of screening and use in studies on population and intervention.¹² There are 3 versions of the ASQ, the last of which (ASQ-3) was published in 2009. The ASQ is among the 4 developmental screening questionnaires recommended by the AAP for identifying developmental disorders in infants and young children.⁴

The ASQ-3¹³ comprises a series of 21 age-appropriate questionnaires that detect developmental delays in children between 1 and 66 months of age in 5 developmental areas: communication, gross motor skills, fine motor skills, problem-solving, and personal-social development, in addition to open questions designed to elicit parents' concerns regarding development.

A rigorous translation and cultural adaptation are necessary to ensure the appropriateness and feasibility of the instrument in other languages and cultural contexts. Translation involves expressing a test in another language while preserving its original meaning. Cultural adaptation refers to the practical overall process of moving a test from 1 culture to another; it may include translation, cultural modifications, and methods for

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verifying cultural appropriateness, validation, and standardization.¹⁴ This process is essential when planning to use the ASQ in a new country. It is currently all the more important, however, in that international immigration is a major social phenomenon, and professionals are increasingly faced with populations for which the original ASQ, unlike many other tools, was not developed, hence the importance of learning about other versions that have been adapted and how they were designed.

Some common translation methods found in the literature¹⁴⁻¹⁶ include forward and backward translation,⁸ double translation and reconciliation,⁵ translators' committee,⁶ concurrent test development,¹⁷ and a combination of multiple methods.¹⁸ In reviewing the guidelines of the International Test Commission,¹⁴ the World Health Organization¹⁹ and the World Bank,⁷ Clifford et al.¹² identified 4 key aspects of the test translation process: (1) pre-translation activity, (2) translator information, (3) translation steps, and (4) piloting. Although common themes appear across theoretical translation guidelines, there are also notable differences.²⁰ For example, Swaine-Verdier et al.⁶ argued that the forward-backward translation method has become a *gold standard*, although there is little scientific evidence to support it. Acquadro et al.,²¹ in their review, found 17 sets of methods for translating health-related quality of life questionnaires. Although a rigorous and multistep approach may lead to better translations, their findings suggest that no empirical evidence favors 1 method over others. Kiing et al.²² recommend a multistep approach and criticize different guidelines for providing a theoretical framework that fails to follow this approach.

Insistence on translation may obscure important aspects of the wider cultural adaptation process. It is sometimes assumed that good translation equivalence guarantees that an adapted test will maintain item and scale-level equivalence for psychometric properties such as reliability and validity.¹⁸ This is not necessarily the case. Many cultural factors can alter psychometric qualities including differences in psychological concepts or item meanings, differential familiarity with stimulus material, response procedure and style, or discrepancies in education and motivation.^{16,18} According to Van de Vijver and Leung,²³ language, concept, culture, and measurement modifications should be considered to prevent cultural biases and to enhance a test's psychometric properties.

One may legitimately question the feasibility and appropriateness of an adapted test and its ability to measure the same concepts as the source version.²¹ Before conducting full-scale empirical studies of validity, methods to verify cultural appropriateness should be examined. These include the expert review, the interview with administrators and examinees, cognitive interviewing, the survey, the focus group, and the pilot study.^{7,14,15,19} All may be highly useful for identifying irrelevant linguistic and cultural properties, revising the test, and reducing possible biases before collecting data for statistical analyses.^{16,23}

Translation, cultural modifications, and verification processes are inherent to cultural adaptation. All 3 are equally important for producing a target version that is culturally appropriate. Distance between the source and the targeted cultures should be considered to adopt a model that recognizes ethnic identity and to avoid the cognitive bias of considering the Western concept of child development as normative.^{23,24}

Given that there are few step-by-step systematic and practical guidelines in the scientific literature and that no evidence favors 1 methodology over another, we may assume that different methods were used to culturally adapt the ASQ. Gathering information pertaining to its translation and cultural adaptation processes is a preliminary step for fully appreciating the results of the studies based on an adapted version of the instrument and for improving knowledge and understanding relative to the cultural adaptation of tests and instruments in a real-life setting. This scoping review aims to provide a data mapping and narrative synthesis of the available peer-reviewed scientific literature on the translation and cultural adaptation processes of the ASQ as reported by the authors. It also seeks to paint an overall portrait of the implementation of the translated and culturally adapted ASQ worldwide. A scoping review was chosen because we expected to engage with a broad and diverse body of literature in view of our research questions, which were more descriptive than the types of questions usually used in a systematic review. Our objective was to map the available worldwide literature on ASQ translation/adaptation rather than critically assess different translations/adaptations. As a result, we found that the scoping review was best suited for this purpose.

METHOD

Search Strategy and Review Questions

The search strategy goal was to overview and to summarize peer-reviewed literature regarding the Ages and Stages Questionnaires (ASQ) translation and cultural adaptation processes. The strategy was as broad as possible because this scoping review aimed to gather information and address exploratory research questions.^{25,26} The specific review questions are as follows:

1. What are the processes underlying ASQ translation and/or cultural adaptation?
2. What types of cultural modifications are made?
3. What processes are used to verify cultural appropriateness?
4. What are the translators' and reviewers' characteristics?

Literature Search of Studies Published in Peer-Reviewed Journals

Articles published between 1995, the ASQ first edition publication year,⁹ and May 11, 2018, were identified via systematic searches of peer-reviewed literature carried

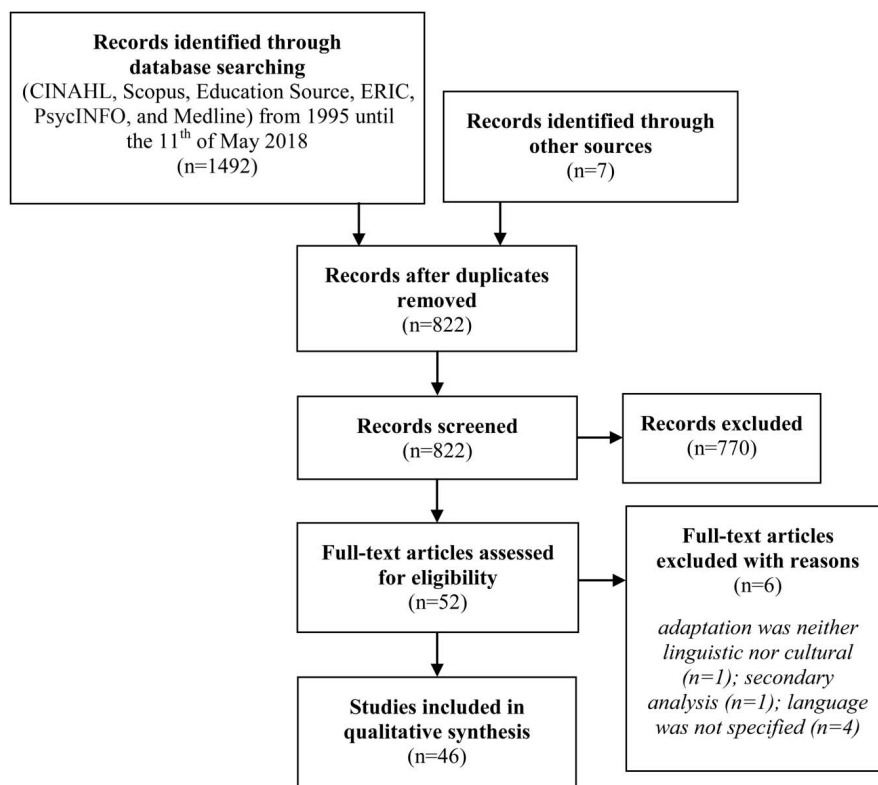


Figure 1. PRISMA flow diagram of review process. CINAHL, Cumulative Index to Nursing and Allied Health Literature; ERIC, Education Resources Information Center; PRISMA, Preferred Reporting Items for Systematic Reviews

out using the following electronic databases: CINAHL, Scopus, MEDLINE, Education Source, PsycINFO, and ERIC.

In keeping with Arksey and O'Malley,²⁵ a wider definition of keywords was used to ensure in-depth coverage of the literature. The search was performed using the following keywords: (“ages & stages questionnaire” OR “ages & stages questionnaires” OR “ages and stages questionnaire” OR “ages and stages questionnaires”) AND (translat* OR traduc* OR adapt* OR compar* OR version* OR equivalenc* OR valid* OR psychometric* OR applicab* OR feasib* OR appropriate* OR measur* OR norm* OR standard* OR score* OR language* OR cultur* OR cross-cultur* OR cross-section* OR speak* OR countr* OR global* OR dialect* OR communit* OR local*). In addition, manual searches of retrieved eligible articles and other relevant literature reviews or manuals or bibliographies were performed.

Criteria for Inclusion and Exclusion

Included studies were (1) peer-reviewed, (2) data-driven (i.e., not a review), (3) written in English, French, or Spanish, and (4) observant of the following criteria as reported by the authors: (1) describe the processes underlying an ASQ translation and/or cultural adaptation or (2) describe the processes underlying the verification of cultural appropriateness of an ASQ translation and/or cultural adaptation.

There were 4 bases for exclusion: (1) the adaptation was neither linguistic nor cultural; (2) the authors did

not explicitly mention using a translated or culturally adapted version; (3) the language was not specified; and (4) the focus of study was the Ages & Stages Questionnaires: Social-Emotional (ASQ:SE) the Ages & Stages Questionnaires: Inventory (ASQ:I), and the Extended ASQ (EASQ) because they are distinct instruments. Because the purpose of this review is to paint a broad portrait, there were no exclusion criteria based on the quality or the use of the English source version as a referent and no restrictions as to time or geography.

Procedure for Review

The initial search was performed by the third (R.S.) author using the key search descriptors. Articles were exported in EndNote, and duplicates were removed. Retrieved titles and abstracts were screened for inclusion, and articles deemed to meet the inclusion criteria were reviewed in full. This selection process was supervised by the first author. Figure 1 illustrates the process of articles selection, which followed the Preferred Reporting Items for Systematic Reviews Statement.²⁷

Consistent with El-Behadli et al.,²⁰ we found no standardized framework to evaluate translation and cultural adaptation processes in a cross-cultural assessment field. An extraction form was developed to code full-text articles assessed for eligibility based on the theoretical guidelines and review questions. Ten articles were rated separately by the first (M.R.) and third (R.S.) authors, and the extraction form was slightly revised as a result. The



Figure 2. Adapted Ages & Stages Questionnaires, Implementation Worldwide.

final form included article references and information to identify the target version: country, culture, language, source version reference, and adapted age-interval questionnaires. Each excerpt describing translation and cultural adaptation processes was extracted. Five types of cultural modification were included in the extraction form. Concept modifications include accommodations in 1 of the 5 developmental areas measured by the ASQ. Cultural content modifications involve cultural or societal differences in characteristics, norms, values, or practices. Furthermore, language modifications consider linguistic differences in structure or vocabulary. Measurement modifications address differential familiarity with assessment procedures or minimize cultural differences that are due to formats, items, or responses. The 4 previous types of modifications were derived from van de Vijver and Leung²³ with a few slight differences in terminologies and definitions. Visual content modifications were also examined because the ASQ is an illustrated instrument, and this calls for modifying, removing, or adding illustrations. Finally, the characteristics of forward translators, backward translators, and reviewers were reviewed in the form. The focus of this study is ASQ translation and cultural adaptation, which involves the first steps for using the new version in a new cultural context. Accordingly, our search strategy and extraction grid were mainly concerned with articles on translation and cultural adaptation. Although the psychometric qualities of the different adaptations were tested, they are not discussed because the information needed to provide a complete portrait of the psychometric properties of other ASQ versions was incomplete.

The third (R.S.) author extracted the data from the articles in the extraction form and transposed them to a secondary analysis grid where articles related to the same adaptation were grouped together. Adaptations were then classified by language, country, and source version edition. The second (C.D.) and third (R.S.) authors revised the primary data and performed thematic

analyses. Data were clustered, and statistics were compiled (Figure 2).

RESULTS

Regarding the 46 articles included in the narrative synthesis, 37 different cultural adaptations were identified in 29 languages and 27 countries. Please see Supplemental Digital Content, <http://links.lww.com/JDBP/A298>, for a mapping of those adaptations. For example, Portuguese in Brazil and Portugal is considered 1 language, although it has local particularities. Eighteen adaptations (48.6%) had the Ages and Stages Questionnaires (ASQ) second edition¹⁰ as a source version, whereas 19 adaptations (51.4%) resulted from the ASQ third edition.¹¹ The search strategy did not identify any ASQ first edition⁹ adaptations. The first article identified was published in 2003.²⁸ Table 1 presents ASQ-2 adaptations, and Table 2 presents ASQ-3 adaptations classified by language and country, along with the translation, cultural modification, and verification processes as well as adapted age-interval questionnaires. Although there are other ASQ adaptations, only 37 were selected based on the inclusion criteria.

There are 19 age-appropriate questionnaires in the ASQ-2¹⁰ and 21 questionnaires in the ASQ-3.¹¹ In 14 adaptations of 37 (37.8%), 1 to 6 questionnaires were adapted. Seven to 12 questionnaires were adapted in 8 adaptations (21.6%). Thirteen to 18 questionnaires were adapted in 3 adaptations (8.1%). Thus, the instrument was partially adapted in 25 cases of 37 (67.6%), and the complete instrument (19–21 questionnaires) was adapted in 12 cases (32.4%).

The translation process did not occur in all adaptations. Dionne et al.³⁵ made a slightly modified English adaptation of the ASQ-2 according to Canadian First Nation (Mohawk) cultural norms. Schonhaut and Armijo et al.^{45,49,50} made linguistic adaptations of the published Spanish versions of the ASQ-2 and ASQ-3 to enhance understandability for the

Table 1. Translated and/or Culturally Adapted ASQ-2

Language (Country)	Translation Processes	Cultural Modification Processes	Processes to Verify Cultural Appropriateness	Age-Interval Questionnaires
Afrikaans (South Africa) ¹	Translation	Cultural content	Expert review	36, 42, 48, 54, 60
	Back translation	Language	Teacher review Pilot testing	
Literary Arabic (Lebanon) ²	Translation	Cultural content	Expert review	4, 8, 12, 16, 20, 24, 30, 36, 48, 60
	Back translation	Language	Field testing Interview (parents)	
Chinese Mandarin (Taiwan) ³	Translation	Not reported	Expert review	36
	Back translation		Survey (teachers and parents) Pilot study	
Danish (Denmark) ^{4,5}	Translation	Not reported	Not reported	18, 24, 33, 48, 60
	No back translation			
Dutch (Netherlands) ^{6,7}	Three independent translations	Not reported	Expert review	48, 60
	Three independent back translations		Focus group (parents)	
	Guilléman translation method ^{5,18}			
Slightly modified English (Canada, Mohawk First Nation) ⁸	No translation	Cultural content	Focus group (parents)	10, 12, 14, 16, 18, 20, 22, 24, 27, 30, 33, 36, 42, 48, 54, 60
	Adaptation of the English ASQ-2	Visual content		
French Canadian (Canada, Quebec) ⁹	Not reported	Not reported	Survey and focus group (childcare educators)	All
Hindi (South Africa, Indian immigrants) ¹⁰	Translation	Not reported	Survey (parents)	60
	Back translation			
Hindi (India) ¹¹	Translation	Cultural content	Not reported	4, 10, 18, 24
	Back translation			
Korean (Korea) ¹²	Translation	Cultural content	Expert review	All
		Language	Survey (parents)	
			Comparison with a Korean translation of the ASQ first edition Field testing	
Norwegian (Norway) ^{13–15}	Translation	Not reported	Consultation with one of the original authors	All
	Back translation			
Persian (Iran) ¹⁶	Translation	Cultural content	Expert review	All
	Back translation	Language	Pilot testing	
Spanish (Chile) ¹⁷	No translation	Language	Not reported	8, 18, 30
	Adaptation of the Spanish ASQ-2			
Local vernacular Spanish, Quichua (Ecuador) ^{18–20}	No translation	Cultural content	Not reported	Children 3–61 months
	Adaptation of the Spanish ASQ-2	Language		
Swedish (Sweden) ^{21,22}	Translation	Not reported	Comparison with Norwegian questionnaires	4, 12
	Back translation			
Swedish (Sweden) ^{23,24}	Adaptation of the Norwegian ASQ-2	Not reported	Not reported	20, 24
Thai (Thailand) ²⁵	Translation	Cultural content	Expert review	24, 30, 36
	Back translation	Language	Survey and interview (parents and childcare staff/teachers)	

(Table continues)

Table 1. Continued

Language (Country)	Translation Processes	Cultural Modification Processes	Processes to Verify Cultural Appropriateness	Age-Interval Questionnaires
Turkish (Turkey) ²⁶	Translation Back translation	Concept Cultural content Language	Expert review Interview (parents and teachers)	All

ASQ, Ages and Stages Questionnaire.

Chilean population. Handal et al.^{46,47,51} adapted the published Spanish ASQ-2 into the local vernacular to prevent cultural and language bias.

Other authors chose to offer a culturally adapted version in addition to a translated version. In Peru, the test was applied either in Spanish or Quechua, depending on the home language. Because the instrument was used in rural regions with high levels of poverty and low education levels, Chong et al.⁵² found that a minimal contextual adaptation of the Spanish ASQ-3 was necessary to ensure that all test items could be easily understood. A Quechua translation was also done, but surveyors may have translated certain items individually because of local differences. D'Aprano et al.^{53,54} faced similar challenges when adapting the ASQ-3 for Australian Aboriginal communities that were significantly different from one another. They chose 2 communities, coastal and desert, which were typical of remote and significantly disadvantaged Aboriginal communities. Several cultural content and linguistic modifications were made, providing a useful plain-language English adaptation. For example, 1 of the cultural adaptations reported by D'Aprano suggests drawing a line in the sand with a stick instead of using crayons and paper. As well, the questionnaires were offered in the 2 local Aboriginal languages.

Translation Processes

Thirty-three cultural adaptations (89.2%) of 37 included a translation. Statistics regarding the translation processes were thus calculated on 33 and not 37. Forward translation was reported in 6 cases (18.2%). This does not necessarily mean that no other translation method was used because it may also indicate a lack of information. The forward-backward translation method was reported in 25 cases (75.8%). A committee approach was adopted for the translation process in the Australian Aboriginal ASQ-3 adaptation.^{53,54} Moreover, although the authors of the Chilean Spanish ASQ-3 did not translate the instrument, they reported using the back translation method to evaluate cultural modification appropriateness.

In 15 cases (45.5%), at least 1 forward translator characteristic was reported. Categories are not mutually exclusive and are identified as reported by the authors. These characteristics are author, researcher, or investigator (n = 5)^{31,40,53-57}; target language native (n = 4)^{31,44,53,54,58,59}; professional translator, skilled trans-

lator, or translator with experience (n = 4)^{30,38,58-60}; bilingual or fluent (n = 3)^{38,53,54,61}; expert in child development, developmental specialist, or having experience in the field of child development (n = 3)^{44,62,63}; language teacher (n = 2)^{38,61}; bicultural or having 2 nationalities (n = 2)^{53,54,61}; language expert or linguistic consultant (n = 2)^{53,54,63}; teacher (n = 1)²⁹; and pediatrician (n = 1).^{53,54} Regarding the 25 adaptations in which a back translation was reported, at least 1 back translator characteristic was reported in 9 cases. These characteristics are bilingual or fluent (n = 3)^{30,53,54,61}; professional translator or interpreter (n = 3)^{31,55,56,60}; English native (n = 2)^{55,56,58,59}; target language native (n = 1)^{53,54}; English professor (n = 1)⁶⁴; and author (n = 1).⁵⁷

Cultural Modifications

The authors reported having made cultural content, language, and visual and/or conceptual modifications in 26 adaptations of 37 (70.3%). No measurement modifications were reported. Language modifications were reported in 18 adaptations of 37 (48.6%); this will not be discussed here because a different contextual framework is required for better insight into their significance. Conceptual modifications were reported in 1 adaptation. The authors of the Turkish ASQ-2 adaptation⁵⁷ reported that alterations were made in the area of communication; new items were added or existing items moved to an earlier age questionnaire.

Cultural content modifications were reported in 24 of 37 adaptations (64.9%). The following categories are not mutually exclusive (Table 3).

Visual modifications were reported in 3 adaptations of 37 (8.1%). Dionne et al.³⁶ reported inserting Mohawk-derived graphics and adding a drawing to clarify the sentence “mostly within the lines.” Kvestad et al.⁶⁶ added some pictures to ensure cultural appropriateness. Because many caregivers are illiterate in English or their native language and because the original ASQ-3 has very few illustrations “and those used depict white children in clothing, or near items of furniture,” a local artist illustrated the Australian Aboriginal adaptation^{53,54} with culturally appropriate figures, producing a 210-colour companion booklet with illustrations in which every item of the questionnaires was illustrated with small black and white images.

Table 2. Translated and/or Culturally Adapted ASQ-3

Language (Country)	Translation Processes	Cultural Modification Processes	Processes to Verify Cultural Appropriateness	Age-Interval Questionnaires
Afrikaans (South Africa) ²⁷	Translation Back translation	Cultural content Language Length reduction	Interview (carers) Pilot study	24, 27, 30, 33, 36, 42, 48
Bangla (Bangladesh) ²⁹	Translation	Cultural content	Not reported	9, 18
Bengali (India, West Bengal) ³⁰	Translation	Cultural content	Not reported	12, 14, 16, 18, 20, 22, 24
Standard simplified Chinese (China) ³¹	Translation Back translation Initial work and subsequent translation efforts followed ITC guidelines ¹⁴	Cultural content Language	Expert review Field testing Interview (parents and pediatricians)	All (except 2 and 9)
Dutch (Netherlands) ³²	Translation Back translation	Not reported	Expert review Interview (mothers)	2, 4, 6, 8–10, 12, 14, 16, 18, 20, 22, 24, 27, 30, 33, 36, 42
Simplified English	Committee approach	Cultural content	Interview with Aboriginal community members and experts	2, 6, 12, 18, 24, 36, 48
Two unspecified Aboriginal languages	Translation	Language	Consultation with ASQ-3 authors	
Standalone illustrated booklet (Australia, Aboriginal/Torres Strait islanders) ^{33,34}	Back translation	Visual content (the questionnaires were entirely illustrated) Decentering process Overall section omission Additional explanations	Pilot testing and reviewing Expert review Group and individual interview (informants and parents)	
Finnish (Finland) ³⁵	Translation Back translation	Not reported	Publisher approval	Child's age 1.9–5.7 years
Georgian (Georgia) ³⁶	Translation Back translation Translation and adaptation method recommended by the ASQ-3 publisher and editorial board	Language	Working with the ASQ-3 editorial board Expert review	All
Hassaniya (Algeria, Saharawi refugee camps) ³⁷	Translation process followed the WHO guidelines ¹⁹ Not otherwise specified	Cultural content	Expert review Discussion with the research team and the field group	18, 20, 22, 24, 27, 30, 33, 36, 42, 48
Hindi (India) ³⁸	Translation process followed the WHO guidelines ¹⁹ Back translation	Cultural content Visual content	Review by the team	12, 14, 16, 18, 20, 22, 24, 27, 30, 33, 36
Italian (Italia) ³⁹	Translation Back translation	Cultural content Language	Pilot administration	42, 48
Nyanja (Zambia) ⁴⁰	Translation Back translation	Cultural content	Expert review Pilot phase	All

(Table continues)

Table 2. Continued

Language (Country)	Translation Processes	Cultural Modification Processes	Processes to Verify Cultural Appropriateness	Age-Interval Questionnaires
Portuguese (Brazil) ^{28,41}	Translation Back translation was performed according to the ITC guidelines ¹⁴	Cultural content Language Adjustment to public daycare context	Comparison with Spanish ASQ-3 Expert review Pilot study Teachers' and caregivers' suggestions Consultation with one of the original authors	All (except 2)
Portuguese (Portugal) ⁴²	Translation Back translation	Cultural content Language	Expert review Pretest	9, 18, 30
Sesotho (South Africa) ⁴³	Translation Back translation	Cultural content Language Length reduction	Interview (carers) Pilot study	24, 27, 30, 33, 36, 42, 48
Spanish (Chile) ^{44,45}	No translation Adaptation of the Spanish ASQ-3 Back translation	Cultural content Language Addition of examples	Expert panel Pilot trial Interview and focus group (mothers and health care providers)	8, 18, 30
Spanish and Quechua (Peru) ⁴⁶	Adaptation of the Spanish ASQ-3 Translation to Quechua	Cultural content Language	Two pilot tests	2, 4, 6, 8–10, 12, 14, 16, 18, 20, 22, 24
Spanish (United States, Latino Americans) ⁴⁷	Not reported	Not reported	Interview (parents) Field testing	All
Zulu (South Africa) ⁴⁸	Translation Back translation	Cultural content	Expert review Pilot phase	All

ASQ, Ages and Stages Questionnaire; ITC, Intentional Test Commission; WHO, World Health Organization.

Processes to Verify Cultural Appropriateness

At least 1 method—pilot study, individual interview, survey, or focus group with respondents (parent/caregiver teacher, daycare educator, or healthcare provider)—was reported in 24 adaptations of 37 (64.9%). The following categories are not mutually exclusive. The method most commonly reported was a pilot study ($n = 15$),^{29-31,40,43,44,48-50,52-54,58,59,61,63,67,68} which is a generic expression that may include a quantitative pretest and/or qualitative verification, also referred to as a pilot test, pilot testing, pilot administration, pilot phase, pilot trial, field study, field testing, and pretest. Other reported methods were the individual interview ($n = 9$),^{30,43,49,50,53,54,57,63,64,68,69} followed by the focus group ($n = 5$)^{34-37,49,50,53,54} and the survey ($n = 5$).^{31,37,38,40,64}

The authors report having performed an expert review in 19 adaptations of 37 (57.6%), and at least 1 reviewer characteristic was reported in all cases. The following categories are not mutually exclusive and are identified as reported by the authors (Table 4).

Other reported methods to verify cultural appropriateness include consultation with the original ASQ authors or editors ($n = 5$),^{28,41,42,53,54,58-60,72} comparison

with an earlier edition adaptation in the same language ($n = 1$),⁴⁰ and comparison with another adaptation in a similar language ($n = 2$).²⁹⁻³² No methods to verify cultural appropriateness were reported in 7 adaptations of 37 (18.9%).^{32,33,39,45-47,51,62,65,71,73}

DISCUSSION

Our first objective was to provide a data mapping and a narrative synthesis of the available peer-reviewed scientific literature regarding the Ages and Stages Questionnaires (ASQ) translation and cultural adaptation processes as reported by the authors. Two main conclusions can be drawn. First, cultural modifications were relatively minor and generally made to establish equivalence with the source version by accommodating cultural differences relative to the availability of materials or in norms, values, or practices. Conceptual modifications were only reported in the Turkish ASQ-2 adaptation,⁵⁷ resulting in the addition of new items, and no measurement modifications were reported. The act of moving a test from 1 culture to another involves a consideration of the distance between the 2, which may be influenced by language and geographical location, religion, customs,

Table 3. Reported Cultural Content Modifications

Categories of Cultural Context Modifications	Specific Modifications	Number of Cultural Adaptations (n)	Articles in the List of References
Cultural differences in the unit of measure or identification	Converting inches and feet to metric units	4	29,30,40,58,59
	Replacing US currency with the target country currency	1	29
	Using descriptive statements instead of home addresses	1	36
Replace objects or food when they were not available or not used in the target culture	“Cheerios” with another food	7	30,39,40,49,50,57–59,65
	Replacing “stuffed animals” with names of similar materials	1	57
	Drawing a line in the sand instead of using crayons and paper	1	53,54
	Changing “child’s ability to imitate vacuuming” to “child’s ability to imitate sweeping”	1	52
	Replacing “Find my coat” to “Find my shoe” and “Get your book” to “Get your (other relevant belonging)”	1	66
		1	66
	Replacing the zipper with a magnet that the child could move up and down on a magnetic board	1	64
		1	43
	Adding “cut straws” instead of “beads”	1	29
	Replacing “threading macaroni onto a string” with “beads”	1	30
	Deleting the “snowman” option in the person drawing	1	29
	Replacing the sentence “Ice is cold, fire is...” with “Juice is cold, soup is...”	1	66
	Changing the word “applesauce” to “jam”	1	
Cultural habits, norms, and practices	“While looking at himself in the mirror, does your child offer a toy to her own image” to “While looking at himself in the mirror, does your child smile and interact with the reflection”		
	Changing spoon and fork to other utensils or eating methods like hands, chopsticks or flat bread	5	40,46,47,51,63,65,66
	Replacing the combination of first and last names with another way of naming such as surname, using only the first name, or the parents’ name	5	36,48,57–59,66
		3	36,57,64
	Replacing “Put the shoe on the table” with a more appropriate command	1	64
	Using a polite suffix in front of the words “mother,” “father,” “teacher,” “grandma,” etc.	1	30
	Replacing games with ones more commonly used in the target population		

beliefs, or any other factor that defines a specific culture economically, sociologically, and politically.²⁴ This review shows that, even when the distance between source and target cultures was significant, no wide-ranging modifications were made, and the core construct of child development was not questioned.

Second, the processes used to translate and culturally adapt the ASQ varied widely in types of methods and sequence of operations. However, certain methods are frequently reported. Although little scientific evidence supports it,⁶ forward translation followed by back translation seems to be the preferred translation process. Back translation ensures that the source and target versions retain the same meaning,¹⁵ although this may result in limitations regarding the broader cultural adaptation process. The equivalence achieved by a good translation does not guarantee that the target version will retain the same psychometric properties, which can be altered by numerous cultural factors.¹⁸ To compensate for these limitations, we suggest using methods to verify cultural appropriateness.¹⁴ Our review demonstrates that most authors reported using at least 1 verification method. An expert review is preferred to verify cultural, linguistic, and developmental appropriateness, whereas a pilot study, which includes a pretest, interview, survey and

focus group, makes it possible to consider respondents’ and users’ viewpoints.

Our second objective was to help paint an overall portrait of the implementation of translated and culturally adapted ASQ questionnaires worldwide. Although our chief aim was not to identify all available adaptations, we noticed that the ASQ is well implemented internationally and has been adapted within various cultural contexts on all continents.

Since the scientific literature on test adaptations remains highly theoretical and is not always adapted to real-life settings, the exploration of ASQ implementation across the world may serve as a proven case study for establishing practical guidelines. To this end, future research could focus on additional relevant cultural adaptation steps that include linguistic modifications, purposes, implementation and administrative procedures, validation, and standardization. We recommend that authors intensify their efforts to develop systematic methodologies that consider the weight of language and culture. The process of cultural adaptation includes each step involved in moving a test from 1 culture to another: translation, cultural modifications, methods to verify cultural appropriateness, validation, standardization, and implementation.¹⁴ The target community must be

Table 4. Reported Methods to Verify Cultural Appropriateness

Categories of Cultural Context Modifications	Specific Modifications	Number of Cultural Adaptations (n)	Articles in the List of References
Knowledge of English or the target language/culture	Target language native or community member	3	53,54,61,70
	Bilingual or fluent	2	58,59,61
	Cultural expert	1	53,54
	Linguistic expert	1	53,54
	English native	1	58,59
	English teacher	1	61
Working in the medical field	Pediatrician, preventive care pediatrician, pediatrics expert or neonatologist	6	30,34,35,40,44,49,50,60
	Professional in the field of child psychiatry or neurologist	2	49,50,57
	Physician or child health care doctor	2	34,35,66
	Nurse or nursing expert	2	40,49,50
Having expertise in public services and policies	Expertise in public child daycare systems	1	58,59
	Expertise in public programs for low-income families	1	58,59
	National public policy maker	1	49,50
Working or having expertise in early intervention	Early childhood educator, early childhood education expert, or pre-school teacher	4	29,40,49,50,71
	Professional in the field of special education, special education specialist, or professional in the field of child development	2	57,64
	Early intervention expert	1	40
Specialized professionals	Professional in the field of speech and language disorders, speech and language therapist, or language and communication expert	4	29,40,44,57
	Psychologist or clinical psychologist specialized in child psychology	3	44,49,50,70
	Occupational therapist	1	29
Different types of expertise	Expert in child development or developmental specialist		31,53,54,58,59,63,69
	Being an author, researcher, investigator, or professor	5	29,30,34,35,71
	Expertise in psychometrics, psychometrist, or experience in child development assessments in the target region	4	44,48,58,59
	Experience in working in the local community	30	66,70
	Expertise in cross-cultural adaptation instruments	2	58,59
	Expertise in economy	1	58,59

engaged in every step. More specifically, a cognitive debriefing approach with real respondents is required during verification of cultural appropriateness.

Regarding translation and cultural modifications, fundamental consideration must be given not only to test items but also to administrative guidelines including verbal or written instructions. These elements can affect the answers provided by respondents. Unfortunately, there are few studies on the translation and cultural adaptation of guidelines and instructions.

Translation processes should be viewed as part of the entire adaptation sequence. Cultural modifications are equally important to avoid a cultural inappropriateness that may lead to over-recognition or under-recognition, late intervention, and an undermining of the child development construct in the target culture.

Although validation and standardization were not covered in this scoping review, they are just as relevant. A high-quality cultural adaptation is never enough to ensure the instrument's validity for the target population.

Evidence of reliability and validity should be collected using a rigorous methodological approach. Cultural modifications that include major changes are more pertinent, for example, the addition of pictures to replace written information.

This scoping review has limitations. First, it summarizes only peer-reviewed scientific literature. It is possible that ASQ cultural adaptations have been made to respond to practical needs without resulting in publication. The evidence found in gray literature such as theses, manuals, government reports, or conferences are beyond the scope of this review. Second, the studies included are written in English, French, or Spanish. To our knowledge, many articles have been published in other languages. Third, because of the keywords used to perform the search, versions that were culturally modified without being translated may have been omitted. Fourth, some authors did not clearly indicate that they used a translated or culturally adapted ASQ or else failed to provide sufficient details to identify adaptations such

as language. These articles were excluded from the search strategy. Fifth, psychometric properties, validation, standardization, implementation, and administrative procedures were not examined, although these are crucial steps in the cultural adaptation process. Sixth, the quality of the articles was not assessed. Finally, we may have overlooked relevant publications in our search strategy, despite a systematic and exhaustive review methodology.

What is more, the information reported was often inadequate or lacked sufficient detail. Said information may be published in non-peer-reviewed sources, but these sources were beyond the scope of this review. For the most part, they provide no assurance of quality and are not easily accessible, notably because of the language barrier. An interesting future project, therefore, could focus on the development of a procedure to document the adaptations made when using this type of instrument along with a mechanism for sharing the work.

The International Test Commission suggests providing technical documentation of any changes, methodology, and evidence to better evaluate adaptation suitability and the results yielded in the articles.¹⁴ However, high-quality adaptations may not always result in publication.²⁰ Caution must be used when evaluating the quality of an adaptation based exclusively on the reported information in scientific journals. Several aspects including cultural and practical contexts, resources, and purposes should be considered.

Looking ahead, we need to increase our knowledge regarding cultural adaptation processes in real settings to achieve a balance between high-quality requirements and concrete needs, purposes, and limitations. To that end, we ask researchers and practitioners not to base their methodologies on written guidelines alone. Expertise must be sought through exchange and dialogue with other researchers and practitioners from different cultures and with test publishers and authors, professional translators, experts, etc. This review shows that cultural adaptation processes are the result of a complex encounter between 2 cultures and between multiple factors including purposes and limited resources.

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