CROSS-CULTURAL ADAPTATION AND VALIDATION OF MALAY LANGUAGE VERSION OF A SOCIAL EMOTIONAL DEVELOPMENT SCREENING INSTRUMENT FOR TODDLERS

Arumugam CT[1], Said MA[1,2], and Nik Farid ND[1,3].
[1]Department of Social and Preventive Medicine, Faculty of Medicine, University of Malaya, Kuala Lumpur, Malaysia
[2]Centre for Epidemiology and Evidence-Based Practice (CEBP), Department of Social and Preventive Medicine, Faculty of Medicine, University of Malaya, Kuala Lumpur, Malaysia
[3]Centre for Population Health (CePH), Department of Social and Preventive Medicine, Faculty of Medicine, University of Malaya, Kuala Lumpur, Malaysia

Correspondence:

Mas Ayu Said,
Centre for Epidemiology and Evidence-Based Practice (CEBP),
Department of Social and Preventive Medicine,
Faculty of Medicine, University of Malaya,
50603 Kuala Lumpur, Malaysia
Email: mas@ummc.edu.my

Abstract

This validation study aimed to provide a validated Malay language version of the Ages and Stages Questionnaire: Social Emotional-2 (ASQ:SE-2) as a developmental screening tool for the social emotional development of Malaysian toddlers. In this study, content validity determination, translation, cultural and lingual modifications, and construct validity were made to the original English version of ASQ:SE-2. A pilot study was conducted to determine the internal consistency and construct validity of ASQ:SE-2 18-Month and 36-Month Questionnaires, with 100 respondents for each instrument, respectively. Test-retest reliability was conducted on 60 respondents for each instrument, respectively. Acceptable internal consistency was obtained based on Cronbach's alpha of 0.731 and 0.686 for ASQ:SE-2 18-Month and 36-Month Questionnaires, respectively. Reproducibility of both sets of instruments are excellent, with Intraclass Coefficient of 0.922 and 0.970 for 18-Month and 36-Month Questionnaires, respectively. The Malay Language version of the ASQ:SE-2 has appropriate validity and reliability for screening social emotional developmental of Malaysian toddlers.

Keywords: Social Emotional Development, Screening Tools, Reliability, Validity

Introduction

Throughout the human lifespan, early childhood is a phase considered to be the most important. These early years of an individual play a vital role in health equity, determining the developmental trajectory along the years of an individual's life course (1). Facilitating children to develop their full potential gives high rates of return in later phases of life (2). The key domains of child development – physical, social emotional and cognitive, strongly influence the well-being of a child; eventually shaping their adolescence and adulthood phases. Social emotional development is also termed social emotional competence. It is operationalized as a skill to understand, to deal with and to respond to one's emotion in social situations (3). It is in the first five years of a child's life that he or she learns to develop skills that support the ability to effectively handle social situations (4).

As a child embraces adulthood, social emotional competencies are vital for formation of friendships, intimate relationships, parenting, and the ability to work and contribute as a member of the community (5). The importance of this critical domain should not be disregarded, and early detection of social emotional developmental delays are essential (6). Many publications have portrayed the benefits of early intervention for early childhood developmental disorders (7,8). Early intervention is only possible when child developmental issues are picked up on children with high possibility of exhibiting delayed or abnormal development, which is identified through developmental screening. Developmental and health screening is the administration of screening instruments, medical examinations, hearing and vision testing, parent questionnaires, and review of records to identify children

who may need further diagnostic assessment done by professionals and parents (9).

Literature states numbers as low as 10% of children below 24 months with risk of developmental delay receive appropriate early intervention (10). Detection rates of developmental delays before a child enters kindergarten were also reported to be as low as 40% in some settings (11). Based on the Malaysian experience, numbers show that a significant majority of children referred to the Welfare Department for developmental delays do not get into the national registry and an even larger number go undetected (12).

The 2016 American Academy of Paediatrics' recommended guidelines include standardized developmental screenings at ages 9-, 18- and 30-month or whenever there is a concern from parents or medical personnel at each clinic visit. Autism-specific screening is recommended to take place at 18 and 24 months of age (13). Screenings of young children for developmental issues are necessary in their early years to effectively detect any underlying issues. In Malaysia, the child health programme contains developmental screenings for gross motor, speech and language, vision, fine motor, and social skills to be administered at specific age intervals (14). Routine developmental assessment at local health clinics is done at the age of 18 and 36 months using the Modified Checklist for Autisms in Toddlers (M-CHAT), a 23-item parent reported questionnaire on child behaviour and development translated into Malay language (15). However, the existing M-CHAT instrument utilized in health clinics have only been tested on its sensitivity in detecting the autism spectrum (16). The

need for a social emotional developmental screening tool in the Malay language to be utilized for the Malaysian population is addressed through adaptation and validation of a developmental screening tool in this study.

Cultural adaptations of existing valid and reliable child development screening instrument is quick and cost effective. Previous research showed that parent-completed questionnaires can be feasibly utilized in the setting of clinics (17). Thus, the usage of a validated, parent-friendly developmental screening instrument adapted to the local sociocultural Malaysian setting, is vital to help increase the rate of screening, diagnosis and early intervention of developmental disorders. The current study describes the Malay language translation and cultural adaptation of the 18-Month and 36-Month Ages and Stages Questionnaire: Social-Emotional-2 (ASQ:SE-2).

Materials and Methods

Ethics

The study has obtained ethical approval from the Malaysian National Medical Research Register (NMRR) ID: NMRR-18-3444-44236. Written informed consent was obtained from all study respondents.

Study Duration and Study Site

The study took place from January to December 2019. Data collection was conducted in Gombak, a district located in the state of Selangor which closely represents the nation's sociodemographic characteristics (18) as summarized in Table 1.

Table 1: Comparison between the demographic characteristics of Gombak district, Selangor state and Malaysia

Area	Ethnicity (%)				Age (%)			Gender	
	Malay	Chinese	Indian	Others	0-14	15-64	≥65	M	F
Malaysia (country)	67.4	24.6	7.3	0.7	27.6	67.3	5.1	51.4	48.6
Selangor (state)	57.1	28.5	13.5	0.8	25.1	71.3	3.6	51.7	48.3
Gombak (district)	62.8	23.5	12.1	1.5	25.6	70.9	3.5	51.4	48.6

Study Sample

Simple random sampling technique was utilized, and data was collected via questionnaire administration to respondents from 2 health clinics in the district of Gombak. Malaysian parents aged above 18 years old with children aged 18 months (ranged 15 to 21 months) and 36 months old (ranged 33 to 42 months) attending health clinics for their routine vaccination and developmental assessment, respectively, were proxies to the sample of study. Inclusion criteria are parents or caregivers who spent at least 15 hours per week with the child assessed. Whereas exclusion criteria are parents of children with congenital abnormalities and parents with disabilities as these factors may disrupt the social emotional development of toddlers.

Based on previous literature, if the first eigenvalue is between 3.00 and 6.00, the required minimum n=100 will be adequate for an unbiased estimator of coefficient alpha (19). Hundred respondents each for the 18-Month group and 36-Month group were recruited for testing of internal consistency of ASQ:SE-2 18-Month and 36-Month Questionnaires, respectively (20). Written consents were obtained from parents who were willing to take part in the study.

About the Instrument: ASQ:SE-2

ASQ:SE-2 is a referenced instrument designed to assess the social emotional development of children from 1 month to 72 months of age and assist in screening and early detection

of social emotional difficulties. The first edition of ASQ:SE was developed by Squires et al (20) and published in 2002 by Brookes Publishing Company. It was originally developed to complement the Ages and Stages Questionnaire-Third Edition (ASQ-3), a general development screening tool that was broad-based, encompassing measurements for communication, gross motor, fine motor, problem solving and personal-social skills development (21).

ASQ:SE-2 on the other hand focuses exclusively on child social emotional behaviour, revised from its first edition in terms of updating its normative sample, psychometric properties and improvements to existing items. The second version also increased the questionnaires' sensitivity to autism and other socio-emotional delays by addressing various assessment deficiencies. ASQ:SE-2 assesses seven components of social emotional development; namely self-regulation, compliance, communication, adaptive behaviours, autonomy, affect and interaction with people. ASQ:SE-2 18-Month Questionnaire consists of 34 items (4 of which are general concerns of parents), whereas the 36-Month Questionnaire consists of 38 items (5 of which are general concerns of parents). Four choices of answers are provided for each item, 3 of which are frequency-based; 'rarely or never', 'sometimes' and 'often or always' scored 0, 5 or 10 depending on whether item assessed is weakness-based or strength-based in terms of a child's behaviour. The fourth choice of answer, 'item of concern' is scored 5. Total score is classified as 'no or low risk', 'monitor' or 'refer' based on the cut-off value, with a higher score indicating poor mastery of social emotional developmental and requires further evaluation by a medical officer (20).

ASQ:SE-2 contains different sets of questions designed for age-appropriate development, making up 9 sets for varied age intervals. Two sets of questionnaires were used in this study:

(i) 18-Month Questionnaire (used to assess children 15 to 21 months old), and

(ii) 36-Month Questionnaire (used to assess children 33 to 42 months old)

ASQ:SE-2 has shown to be one of the most comprehensive and psychometrically sound measure widely used around the world in many languages. Through content analysis, review of previous research works and content judgement by 2 public health specialists, ASQ:SE-2 with excellent psychometric properties were chosen to be translated and cross-culturally adapted into the Malay language. Apart from having many sets of questionnaires with short age intervals, it also caters for premature children according to their adjusted age. Details of ASQ:SE-2 validity tested on a norm sample of 16,424 respondents is shown in Table 2 (20).

Permission to adapt the instrument was obtained from the developer. Figure 1 shows steps involved to ensure the instruments translated will be able to give a consistent and dependant result (22).

Table 2: Psychometric Properties of ASQ:SE-2

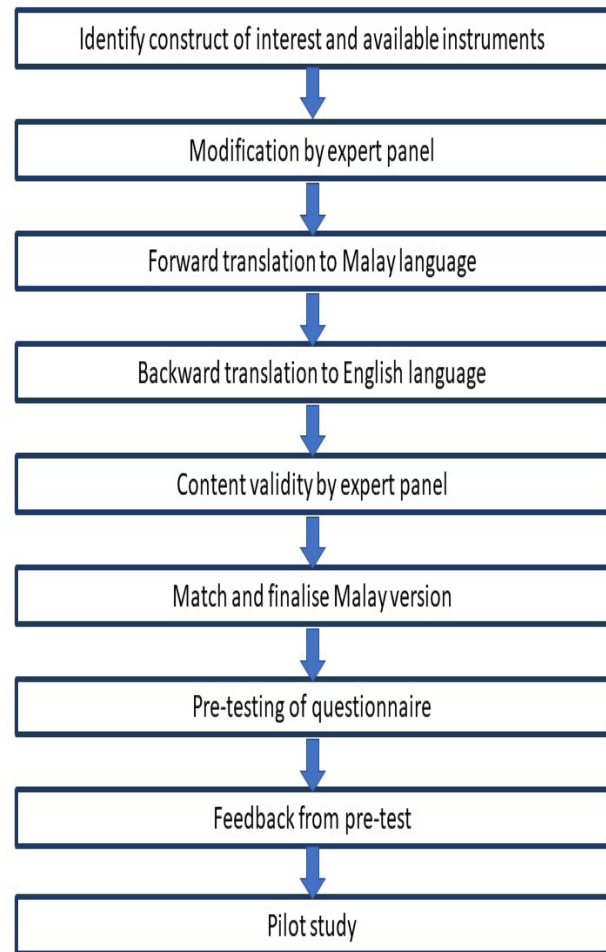| Measure	ASQ:SE-2
Cronbach's alpha	Overall: 0.84 (0.71-0.87)
Inter-rater reliability	0.91
Validity	Agreement with similar tools: 0.81 – 0.95
Sensitivity / Specificity	/ 0.84

Figure 1: Flow chart of validation process

Translation

The English version of ASQ:SE-2 underwent translation into *Bahasa Malaysia* or the Malay language, the national language of Malaysia. Malay is the language used by the general population and is well understood by people of various backgrounds in the study setting. The instruments were forward translated by the principal investigator with a master's in public health and 2 public health specialists (PhD) with more than 20 years of experience independently; for whom the Malay language is their native language. The translators considered the concepts intended to be measured in the study and provided translation that most closely resembles the original version (22).

Backward translation to English was done by a professional linguist who was blinded from the original version of the instrument and was independent of the study. Discrepancies during the translation was discussed over and problematic parts were replaced with more suitable words or phrases. Terms that are controversial to the local cultural norms and beliefs were avoided. Back translation was reviewed by the original questionnaire developer. Translation work was iterated until a satisfactory version of both languages were achieved. The team harmonized the final draft by incorporating recommendations from local clinical panels, parents and public health specialists while making sure to stay faithful to the original questionnaire. Tsang et al. outlined the development and translation process of the questionnaire for application in the medical field (22).

Content Validity

A panel of experts consisting of 4 people examined the content validity: namely a development paediatrician, a clinical psychologist and 2 public health specialists. The instruments were checked on its relevance, clarity, and suitability in the Malaysian context, with amendments suggested according to the sociocultural norms of the local setting. All items in both age interval questionnaires were accepted by all 4 experts, hence item-content validity index (I-CVI) was 1.00 for both 18-Month and 36-Month Questionnaires Malay language. However, some amendments were made for improvement of items based on comments given by the expert panel.

Pre-test

After the Malay language questionnaires were matched and finalised, a pre-test was conducted on ten people to assess the feasibility of respondent recruitment and administration of questionnaires in terms of level of comprehension and time taken to complete them (23). Among other parents, respondents of the pre-test included early childhood educators and health professionals who were able to give a rational judgement on the questionnaires based on their fieldwork experience. Based on feedbacks, we concluded each questionnaire requires an average of ten to fifteen minutes for completion. Questionnaires were deemed to be relevant and comprehensible even by parents with academic qualification as low as primary school. None of the items in the questionnaire was considered socio-culturally inappropriate or sensitive.

Reliability Testing

After pre-testing, the questionnaires underwent psychometric properties testing. Quality criteria proposed for measurement properties of health status questionnaire was used (24). Internal consistency reflects the extent to which the individual items in the questionnaire are inter-correlated and whether they are consistent in measuring the same construct. A criterion of 0.70 to 0.90 was considered as a good measure of internal consistency. A value of 0.96 and above is a sign of redundancy. Test-retest reliability reflects the degree to which the answers of respondents remain relatively consistent during repeated administration. Test-retest reliability was measured using Intraclass Correlation (ICC), with a value of 0.70 or more accepted as good reliability (25, 26). In this study, a retest was done after 1 to 2 weeks from the first evaluation on all 60 respondents.

Construct Validity

To determine construct validity of ASQ:SE-2 Malay Language version, it was necessary to establish an optimal cut-off scoring; whereby individuals above the determined cut-off score are classified as "At risk" and requires further follow-up. There is no absolute score that separates children who are typically developing from those who are not. Finding the optimal cut-off score requires examining alternatives that maximize identification of individuals who truly need further assessment (true positive), while minimizing misidentification of individuals who do not need further assessment (false positive). To determine the accuracy of the tentative cut-off score, and thus the validity of ASQ:SE-2 Malay Language version, 2 methods were used. The Receiver Operating Curve of total scores and the formula given by the questionnaire developer for studies in new settings were used. According to this formula (Median + 1.5 semi-interquartile ranges) of scoring in target population yields the new cut-off score for the translated and culturally adapted version of ASQ:SE-2 (20).

Secondly, the technique used by Heo and Squires, (2012) was utilized whereby comparison of instrument scoring in the Malaysian and Korean samples were made for both age intervals (27). In our study, the mean scores of the Korean normed sample using ASQ:SE were compared with the mean scores of the Malaysian sample using ASQ:SE-2 to investigate differences in performance of the instruments. However, the additional items included in the second version of this instrument was excluded for optimal comparison. Samples from both groups were participants who were typically developing. An independent t-test was used to determine if statistical differences in mean scores of both populations exist (27).

Convergent validity for ASQ:SE-2 Malay Language version, was analysed using correlations to a child's biological criteria; namely prematurity (gestational age below 37 weeks) and birth weight (below 2500 gram) as applied by Kerstjens et al (28). Theoretically, perinatal risk events (29) are shown to exert lifelong influence on socioemotional functioning. *Kendall's τ (tau)* coefficient statistics was used to analyse these correlations as it uses ranks or ordinal data and does not require interval data, without assumption that the variables are normally distributed (30). The correlation between the 2 variables is denoted by 'r', varying between −1 and +1. Zero implies no correlation and 1 means a perfect or complete correlation. The sign of the 'r', either positive or negative shows the direction of correlation. A positive 'r' denoting the variables as positively related and negative 'r' meaning they are inversely related.

Results

Sociodemographic characteristics of respondents

Table 3 shows the sociodemographic characteristics of our study sample used for internal consistency and validity testing. Mean age of the study sample is 18.16 (SD 2.00) and 37.88 (SD 3.01) months for 18-Month and 36-Month intervals, respectively. Gender distribution was almost equal for both sets of questionnaires. Most respondents are Malay, comprising more than 60% for both instruments tested, followed by Chinese and Indians. Only a small portion of parents consist of those without formal schooling or with primary education only. Majority of the study sample hails from middle income families. In terms of biological factors, prematurity and low birth weight accounted for >10% of children in both age groups.

Table 3: Sociodemographic characteristics of study population (n=100) in mean (SD) or percentage, %

Variables		18-Month Questionnaire	36-Month Questionnaire
Gender	Male	51 (51%)	47 (47%)
	Female	49 (49%)	53 (53%)
Race	Malay	62 (62%)	76 (76%)
	Chinese	18 (18%)	11 (11%)
	Indian	18 (18%)	9 (9%)
	Others	2 (2%)	4 (4%)
Mother's education	No formal schooling	0 (0%)	1 (1%)
	Primary school	1 (1%)	1 (1%)
	Secondary school	62 (62%)	47 (47%)
	Diploma and above	37 (37%)	51 (51%)
Father's education	No formal schooling	2 (2%)	1 (1%)
	Primary school	3 (3%)	0 (0%)
	Secondary school	64 (64%)	63 (63%)
	Diploma and above	31 (31%)	36 (36%)
Household income	< RM 1000	1 (1%)	0 (0%)
	RM 1001 – RM 3000	5 (5%)	13 (13%)
	RM 3001 – RM 6000	86 (86%)	69 (69%)
	RM 6001 – RM 9000	5 (5%)	14 (14%)
	> RM 9000	3 (3%)	4 (4%)
Prematurity	< 37 weeks	6 (6%)	8 (8%)
	≥ 37 weeks	94 (94%)	92 (92%)
Birth weight	< 2500 gram	9 (9%)	10 (10%)
	≥ 2500 gram	91 (91%)	92 (92%)

Reliability

Internal consistency of ASQ:SE-2 18-Month and 36-Months Questionnaires were tested on 100 respondents. Each showed good (18-Month Questionnaire; Cronbach's Alpha = 0.731) and acceptable (36-Month Questionnaire; Cronbach's Alpha = 0.686) levels of internal consistency. The reproducibility of both sets of ASQ:SE-2 were excellent, as per tested on 60 respondents (18-Month Questionnaire; Intraclass Coefficient = 0.922) (36-Month Questionnaire; Intraclass Coefficient = 0.970). Both sets of instruments display no floor or ceiling effect.

Validity

(i) Establishing new cut-off scores

The range of scores, medians, interquartile ranges, receiver operating characteristic (ROC) cut-offs and percentages identified for referral by ASQ:SE-2 are displayed in Table 4. Prevalence for poor mastery of social emotional development was recorded as 14% and 13% for the 18-Month and 36-Month intervals, respectively.

Table 4: Cut-off scores of ASQ:SE-2 Malay Language version

ASQ:SE-2 Age Interval	N	Score range	Median	Median + 1.5 semi-interquartile ranges	ROC cut-off score	Cut-off determined	Referral (%)
18-Month	100	0-140	30	55.5	52.5	50	14%
36-Month	100	10-150	50	80.0	85.0	85	13%

(ii) Comparison of scoring between different populations

ASQ:SE-2 Malay Language scoring was compared with Korean samples that used ASQ:SE (first edition). Analyses were made by excluding additional questions in the former as the latest edition. Comparison of scores is shown in Table 5 and Table 6 for 18-Month and 36-Month intervals, respectively.

Table 5: ASQ:SE 18-Month scoring in Korean and Malaysian samples

Sample	N	Mean	SD	t
Korea	265	29.36	21.17	0.179
Malaysia	100	29.80	20.30	

Table 6: ASQ:SE 36-Month scoring in Korean and Malaysian samples

Sample	N	Mean Score	SD	t
Korea	250	40.18	25.15	2.871*
Malaysia	100	48.42	21.86	

* p<0.05

(iii) *Correlation between child biological factors and parental concern*

Premature children, born at a gestational age of below 37 weeks, were associated with poor mastery of social emotional development. This was clinically and statistically significant in both age intervals. The same was also found for low birth weight, with children born less than 2500 grams to be associated with deviant scores on social emotional development, with clinical and statistical significance in both age intervals. Parent's positive response of being worried about their child's development yields statistically positive association with poor scoring of social emotional development. Results are summarized in Table 7.

Table 7: *Kendall's τ (tau)* correlations between child biological factors and parental concern with social emotional developmental scoring for 18-Month interval of ASQ:SE-2 Malay Language Version (n=100)

Criterion	Poor mastery of social emotional development	Prematurity (< 37 weeks)	Birth weight (< 2500 gram)	Parental concern
Poor mastery of social emotional development	1.00	0.262*	0.276*	0.476*
Prematurity (< 37 weeks)	0.262*	1.00	0.803*	0.130
Birth weight (Less than 2500 gram)	0.276*	0.803*	1.00	0.161
Parental concern	0.476*	0.130	0.161	1.00

*$p<0.05$

Table 8: *Kendall's τ (tau)* correlations between child biological factors and parental concern with social emotional developmental scoring for 36-Month interval of ASQ:SE-2 Malay Language Version (n=100)

Criterion	Poor mastery of social emotional development	Prematurity (< 37 weeks)	Birth weight (< 2500 gram)	Parental concern
Poor mastery of social emotional development	1.00	0.215*	0.268*	0.244*
Prematurity (< 37 weeks)	0.215*	1.00	0.516*	0.064
Birth weight (Less than 2500 gram)	0.268*	0.516*	1.00	0.039
Parental concern	0.244*	0.064	0.039	1.00

*$p<0.05$

Discussion

Social emotional issues and behavioural difficulties are common reasons for the clinical assessment of children aged 2 to 5 years old (31). The prevalence of possible delayed social emotional development was found to be 13% (n=210/1579) among 2-year-olds in a prospective cohort study (32). This was similar to finding of this study, whereby 14% and 13% of children aged 18-months and 36-months, respectively, were detected to have poor mastery of social emotional development.

Some studies have reported lower level of socio emotional issues among young children. For instance, Briggs-Gowan et al. found that the prevalence of social emotional problems recorded using at least 1 of the 2 instruments used in this study was 8.6% among children aged 1 and 2-years old (33).

According to the Malaysian National Health and Morbidity Survey (NHMS) 2016, the percentages of developmental delays encompassing all domains according to age groups was 4.0% (95% C1: 2.80-5.81) for children aged 12-23 months and 2.9% (95% CI: 2.25-3.66) for children aged 24-59 months (14). However, the numbers reported by NHMS are confirmed cases of developmental delay, unlike the prevalence of poor social emotional competency detected in our study as part of a screening process.

Cost-effective and rapid screening of a child's development aids early intervention of developmental disorders whilst parent-completed screening instruments may greatly assist professionals in making early diagnosis and subsequent follow-ups. In this validation study conducted in a multi-ethnic population sample from the district of Gombak,

ASQ:SE-2 was chosen due to its in-depth questions that use simple language, with exclusive focus given on social emotional development. The instrument is specified to cater for the developmental measures of toddlers by age intervals, increasing its specificity (20).

The ASQ:SE-2 Malay Language version of this instrument has shown to be potentially useful among toddlers in Malaysia since it manifested an acceptable reliability as well as adequate construct validity. It had good and acceptable levels of internal consistency for ASQ:SE-2 18-Month (Cronbach's Alpha of 0.731) and 36-Month (Cronbach's Alpha 0.686), respectively, as well as excellent reproducibility. The findings are similar to the original version of the instrument, with scores ranging from 0.71-0.87 across age intervals (20). Although a Cronbach's Alpha of 0.686 was reported for our 36-Month interval, it was still at an acceptable level (25, 34). The test-retest Intraclass Coefficient of 0.922 (18-Month) and 0.970 (36-Month) shows excellent level of reliability. The original version of ASQ:SE-2 reported an Intraclass Correlation of 0.91 across intervals, similar to findings of this study (20).

Apart from content validity, previous studies have adapted different methods of validating the ASQ instrument, be it in the first or second editions. In a Korean study, three main steps were involved in testing ASQ:SE validity in the local population. Firstly, optimal cut-off scoring for referral was determined. Two existing instruments of developmental screening in Korea, namely the Kongju Early Developmental Assessment System (KEDAS) and the Child Behavior Checklist for 1.5–5 (CBCL-1.5/5) were used to test convergent validity. Finally, ASQ:SE scoring in the Korean population was compared to the US normative data (27). In investigating the psychometric properties of the Dutch version of ASQ:SE-48-Months, construct validity was assessed using both biological and environmental criteria, namely child's gender, prematurity, mother's age and educational level, and family income (28).

In our study, apart from content validity by experts in the fields of developmental paediatrics, clinical psychology and public health, we had also taken great care in ensuring translational validity by careful interpretation of words and phrases in the original version, confirming that it is also socio-culturally suitable for the local setting. Validity of ASQ:SE-2 Malay language in our study was determined by establishing optimal cut-off scoring, comparison of normative data from a different population and testing its correlation to biological factors. These techniques were adapted from similar previous studies (27, 28).

The accuracy of tentative cut-off score and the validity of ASQ:SE-2 Malay Language version was determined using the Receiver Operating Curve (ROC) of total scores and the formula given by the questionnaire developer for studies in new settings (Median + 1.5 semi-interquartile ranges). A new cut-off score for the translated and culturally adapted version of ASQ:SE-2 was deemed to be valid for usage in the local population (20). This method is utilized by most

studies that report on the cross-cultural adaptation of ASQ:SE-2.

To further determine its construct validity, a comparison of ASQ:SE-2 Malay Language scoring was made to the Korean sample using ASQ:SE first edition by excluding the additional questions included in the second edition. The mean scoring for the 18-Month interval of both populations showed no statistically significant differences (27). The differences observed in the mean scoring of 3-year-olds across these two populations may be attributed to cultural differences that impact parenting style, stimulation given and the environment the child grows up in (35, 36). Differed findings between both populations can also be influenced by other factors such as parental educational level and family income (37, 38). This shows the importance of tailored cut-off scoring for different settings to determine the classification of poor mastery of social emotional development, indicating the need for further evaluation and diagnosis of children involved in the screening programme.

The overall scoring for both 18-Month and 36-Month intervals of ASQ:SE-2 was shown to positively correlate with a child's biological factors, as stipulated theoretically. Premature children, born at a gestational age of below 37 weeks and low birth weight, was correlated with poor mastery of social emotional development, with clinical and statistical significance in both age intervals. Parent's positive response on being worried about their child's development yields statistically positive correlation with poor scoring of social emotional development.

The good psychometric properties displayed by ASQ:SE-2 Malay Language version shows that they can be utilized in Malaysia as a parent assessed developmental screening. The validated parent-friendly developmental screening instrument ASQ:SE-2 adapted into the local sociocultural of Malaysian setting is hoped to increase the rate of screening, diagnosis and early intervention of developmental disorders. In the current digital era, the screening instrument can be made available online at official health websites to enable parents to keep track of their child's milestone attainment levels before visiting clinics for their child's routine health assessment.

The major limitation of this study is our inability to determine concurrent validity of the instrument with a gold standard due to inexistence of a developmental screening focused on social emotional domain utilized in Malaysia, currently. As our study was conducted in government health clinics, the sample may not represent children who undergo follow-ups in private clinics for their health development assessment and those in the general population who are not under any follow-up regimen, especially at 36-months where there is no scheduled vaccination. Although there were respondents from the high-income group, most of the study population (82%) with a household income of below RM6000 fall into the low and middle- income group. Hence, in the future, a validation study of ASQ:SE-2 Malay language version can be

replicated in different parts of the country on populations of varied socio-demographic characteristics.

Overall, the strength of this study was that it is the first, pioneering work for developing a social emotional development screening instrument that is both culturally adapted and validated to be used in Malaysia. We believe that the translated questionnaire has underwent comprehensive measures of reliability, reproducibility and validity testing and is appropriate for usage during the two important stages of child development assessment, at 18 and 36 months old.

Conclusion

The translated Bahasa Malaysia version of ASQ:SE-2 showed good level of reliability, reproducibility, and validity. ASQ:SE-2 18-Month and 36-Month Questionnaires can be utilized as a parent assessed developmental screening instruments as it has been socio-culturally adapted to the local Malaysian setting and has taken into account the characteristics of milestone attainment according to that of Malaysian children.

Acknowledgement

Competing interests

The authors declare that they have no competing interests.

Ethical Clearance

Research ethics approval was obtained from the Medical Research and Ethics Committee (MREC) and National Institute of Health (National Medical Research Register ID: NMRR-18-3444-44236). Informed consent was obtained from all study participants.

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