DEVELOPMENT, CONTENT AND FACE VALIDATION OF PARENT-RATED SCREENING TOOL FOR SPEECH AND LANGUAGE DELAY

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Abstract. Speech and language delays have a negative impact on children's development in terms of psychological, social, and academic. Early screening and intervention significantly help to improve children's future and well-being. Thus, we aim to develop and validate a new parent-rated screening tool for speech and language delay for children 18-24 months in the Malay language. Our study design is a development and validation study. Our screening tool was developed in two stages, the development stage and the judgment and quantification stage. All domains and indicators were identified in the development stage via literature review, expert interviews, and focus group discussion to produce an initial instrument questionnaire. In the judgment and quantification stage, a validation test was conducted using content validation by a matter expert and face validation by a targeted group of layperson. A content validation index and face validation index were calculated in the quantification stage. Our finalized screening tool consists of 4 major domains and a total of 19 questions. The domains consist of pre-verbal, receptive, expressive, and vocabulary domains. The results showed that the questionnaire has a satisfactory content validation index and face validation index.
Keywords: *parent-rated, speech, language delay, children, Malay*

Introduction

Language encompasses the understanding, processing, and production of communication. It is usually composed of two components: expressive and receptive abilities. Speech is the verbal communication of language. It reflects the ability of children to express thought and feeling by articulating sounds. Speech and language delay is defined as the inability of the child to match his expected milestone compared to the same peers (Wallace et al., 2015). Although speech and language delay can stand alone, both problems overlap and coexist in children's development (Siu, 2015). About 2.5% to 11.9 % of preschool children worldwide suffer from isolated or primary speech and language delay (Feldman, 2019). Primary speech and language delay is defined as a speech and language delay without any attributable to another medical condition such as

a hearing problem, intellectual disability, or autism spectrum disorder. There is no apparent local prevalence of isolated speech and language delay in Malaysia. Most studies in Malaysia have focused on the prevalence of speech and language delay caused by other diseases such as autism, attention deficit hyperactivity disorder, and cerebral palsy. For example, one study conducted at Sabah among children aged between twenty-eight months and forty-six months with underlying autism spectrum disease (ASD) found that 56.8% of children have difficulty in speech and language aspects (Apok and Salleh, 2020). A retrospective cohort study conducted at the Developmental Paediatrics Clinic of the University of Malaya Medical Centre (UMMC), Kuala Lumpur, by reviewing medical records of 366 children aged 1-18 years with Autism Spectrum Disease (ASD) found that speech, language and communication problem were most frequent parental concern contributed 60.1% of the ASD cases (Jayanath and Ozonoff, 2020). In Terengganu, a cross-sectional study was conducted among sixty fisherman's children under five years old to determine the association between the nutritional status of children and child development. The study used The Denver II Development screening for the screening of language delay. About 15% of children were reportedly suspected of language delay; however, no further diagnostic tests were conducted to confirm the diagnosis. The study also did not mention any prevalence of speech delay among the children (Bahtiar et al., 2021). The lack of screening activities and a validated screening method for speech and language delays may also contribute to the unknown illness burden in the local setting.

There is wide availability of validated screening and diagnostic tools worldwide, such as MacArthur Bates Communicative Development Inventories (CDI), Age and Stage Questionnaire, and Language Developmental Survey. However, due to the influence of language expression in cultural and social contexts, an instrument validated in other countries may not be valid when applied in other countries (Gjersing et al., 2010). There are few available tools in Malay language for speech and language delay screening and Malay Preschool Language Assessment Tool (MPLAT) was Malaysia's first standardized language test that assessed the receptive and expressive language abilities and early literacy abilities of Malay preschool children aged 4 to 6 years and 11 months. The test is conducted by trained speech-language therapists, clinical psychologists, and developmental pediatricians for MPLAT Diagnostic tests, whereas trained teachers or nurses can conduct MPLAT Screening (Razak et al., 2018). No parent-rated questionnaires were developed for the local setting to be used in primary health clinics to assess speech and language delay for children aged below 2 years old. The parent-rated questionnaire is favorable to be used in a local primary health clinic as it will help avoid increased burdens for health care workers at the primary center.

The watch-and-wait approach was previously used when dealing with speech and language-delayed children. It involves closely monitoring children with speech and language delays without treatment until resolved. Children with speech and language delays at four typically resolved and caught up with their peers at 7 years old (Shriberg et al., 1999). This approach believed that screening could cause harm to both parents and children (Siu, 2015). Harms include extra time, increased effort, and anxiety associated with further diagnostic tests for the children (Pierson, 2014). However, this approach is outdated. Delays in detecting speech and language delays in children cause more harm to both children and parents. According to a speech therapist, the caregiver developed constant tension and anxiety for the late talker, significantly impacting the mother-child bond (Singleton, 2018). Furthermore, school-aged children with language

or speech delays may have a higher risk of learning and literacy disabilities, such as reading and writing difficulties (Conti-Ramsden and Emma Knox, 2001). They may also be more susceptible to behavior and psychological adjustment problems, which can last into adulthood. As a result, early detection of children with speech and language delays is critical, and early intervention can significantly impact the children's future. However, lack of local tool for screnning speech and language delay impaired early detection and intervention for the children. Therefore, our aims are 1) to develop a parent-rated screening tool questionnaire to screen (Zamanzadeh et al., 2015) speech and language delay among children aged 18 months to 24 months and 2) to establish the parent-rated screening tool in the Malay language for its content validity and face validity.

Materials and Methods

Development stage of parent-rated screening tool for speech and language delay in Malay language

A two-step process consists of development stage and judgement-quantification stage is used to develop a new valid screening tool for speech and language delay that acceptable in our cultural and social context.

Development stage of instrument

The Development stage consists of three steps, domain identification, item generation, and instrument formation. The content domain refers to the area of content that is related to the variables being measured. A precise definition of the desired construct's attributes and characteristics yields a clear image of its boundaries, dimensions, and components. A literature review on the topic being measured, interviews with experts, and focus group discussions can help identify the domain. Each domains was further extended through in item generation stage to identify relevant indicators. All domains and its relevant indicators will be re-organized to produce the initial instrument in the last stage of instrument formation.

The judgement-qualification stage

In the judgment-quantification stage, experts are invited to assess the degree to which pertinent content domains have been incorporated into the instrument and the degree to which the instrument was created to measure a particular concept of interest. There was no consensus on the number of experts required to be involved in this stage. An author suggested at least three panels of experts while others recommended having between five to ten panels of experts. In general, the probability of chance agreement decreases as the number of experts increases with at least five experts being recommended to have sufficient control over the chance of agreement. In our development, five panels of experts are invited and have vast experience in engaging speech and language delay among children to assist us in content validation. Our five panel of experts consists of Family Medicine Specialist, Public Health Specialist, Paeditrician, Speech Pathologist and Clinical Psychologist. We also invited a Language Expert to assist in terms of the use of words, comprehension and clarity of the screening tool to ensure the screening tool is suitable for our target group. Laypersons from various background of races, gender, with or without past experiences with children diagnosed with speech and

language delay, guardian to children aged 18 months to 24 months (including mother, father, or nursery teacher), education level and socio-economic background are invited to participate in face validation study.

Content validation

Content validity is defined as the ability of the selected items to reflect the variables of the construct in the measure. It also helps to examine how well an instrument's item represents the content domain (Zamanzadeh et al., 2015). A cover letter, content validity assessment form and copy of the developed screening tool are given to each panel of experts at the start of the content validation process. The cover letter contained a brief introduction to the study, a brief description of the instrument and its scoring, and a description of the content validity assessment form. A panel of experts will validate items in the developed tool in terms of its relevance to the measured domain by using the rating scale as *Table 1*. Based on expert relevance assessments, the content validity index (CVI) is the most often used technique for assessing content validity for multi-item scales. CVI can be calculated for each item in the scale known as I-CVI. I-CVI is calculated as the propotion of experts rating "relevant" for each item divided by the total number of experts. On a 4-point scale, experts' rating of either 3 or 4 is regarded as the relevant item and recorded as 1. In contrast, a rating of either 1 or 2 is regarded as irrelevant and recorded as 0 (Yusoff, 2019a).

I-CVI = agree item/number of expert Eq. (1)

Table 1. *The rating scale for degree of relevance for panel of experts.*

Are the items relevant to the measured domain?	Degree of relevance
1	Not relevant
2	Somewhat relevant
3	Quite relevant
4	Highly relevant

Acceptable I-CVI will be related to the number of experts participating in the content validation process. Based on guidelines, if there are five or fewer experts, the acceptable I-CVI must be 1, however when there are 6 or more experts, it will allow modest disagreements among experts and the acceptable I-CVI should not be lowered than 0.78 (Polit and Beck, 2006). As our content validation process consists of 5 experts, thus, only I-CVI of 1 of each item will be accepted. CVI can also be expressed as a scale level known as S-CVI. It can be calculated in two different methods. The first method is through universal agreement among experts (S-CVI/UA), defined as the proportion of items on an instrument that achieved a "relevant" rating by all the content experts. The universal agreement (UA) score is given as 1 when the item achieved 100% experts in agreement for its relevance, otherwise, the UA score is given as 0.

S-CVI/UA = sum of UA score / number of item Eq. (2)

The second method uses an average of I-CVI known as S-CVI/Ave. It is defined as the average of the I-CVI scores for all items on the scale or the average of proportion relevance judged by all experts.

S-CVI/Ave = sum of I-CVI score / number of item Eq. (3)

The acceptable value for S-CVI/UA is more than 0.80 while S-CVI/Ave should not be less than 0.90 (Polit and Beck, 2006). Although the content validity index has been widely used to quantify content validation, it is still vulnerable to possible chance agreement. The chance agreement is a concern when studying agreement indices among assessors, particularly when four-point scoring is divided into two relevant and non-relevant classes as in this study. To counter this problem Polit et al. (2007) introduced the modified kappa, k, to adjust each value of I-CVI for a chance agreement (Polit et al., 2007). Modified kappa can also assist the researcher in deciding on the revision or deletion of an item. Modified kappa can be computed by the calculated probability of chance agreement, Pc.

Pc = [N! /A! (N -A)!]* . 5N Eq. (4)

Modified kappa then can be computed through this formula:

K= (I-CVI - PC) / (1- PC) Eq. (5)

The acceptable value of kappa ranges from fair (0.40-0.59), good (0.60-0.74), or excellent (=k > 0.74) (Zamanzadeh et al., 2015).

Face validation

Face validity is a non-expert's informal assessment of a questionnaire's clarity, comprehensibility, and appropriateness for the target group (Tanner, 2018). The non-expert can include the person who takes the test, a non-professional person familiar with the construct through direct personal experience or the general public (Yusoff, 2019b; Zamanzadeh et al., 2015). The face validation aims to ensure the questionnaire's acceptability among the respondents. Acceptability of the questionnaire will be rated through clarity and comprehensibility. Clarity refers to whether there were ambiguities or multiple ways to interpret the items, whereas comprehensibility refers to whether raters could easily understand the words and sentences of the constructed item. Face validation is reported by calculating the face-validation index (FVI) either by calculating for each item known as I-FVI or through scale level, S-FVI. I-FVI is calculated as the propotion of non experts giving a rating of “clear and understandable” for each item divided by the total number of non experts. On a 4-point scale, a rating of either 3 or 4 given by non experts is regarded as the clear and understandable item and recorded as 1. In contrast, a rating of either 1 or 2 given by non experts is regarded as not clear and understandable and recorded as 0. Similar to the content validation index, the acceptable value for FVI depends on the number of raters. A number of 10 to 30 raters for face validation is required with cut off of FVI at more than 0.80 to 0.83 is acceptable (Yusoff, 2019b). We used rating scale as in *Table 2* for our study. Calculation for S-FVI/AVE and S-FVI/UA similar with calculation of S-CVI/AVE and S-CVI/UA.

***Table 2**. The rating scale for degree of clarity and comprehension for layperson raters.*

Are the items clear and understandable?	Degree of clarity and comprehension
1	The item is not clear and understandable

2	The item somewhat clear and understandable
3	The item is clear and understandable
4	The item is very clear and understandable

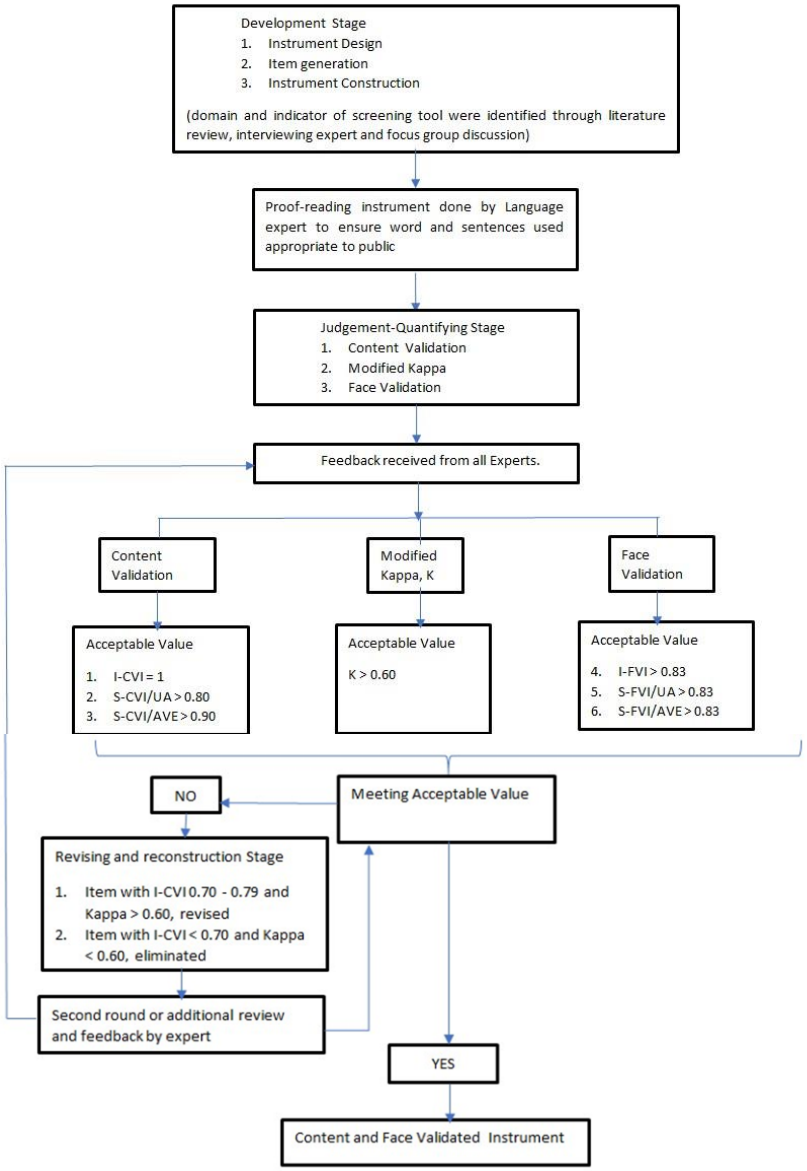

Figure 1. Flowchart for the development stage of parent-rated screening tool for speech and language delay in Malay language.

Results and Discussion

Development stage of parent-rated screening tool for speech and language delay in Malay language

Four essential domains were identified in the development of speech and language delay: The preverbal domain, receptive domain, expressive domain and vocabulary domain through focus group discussion and literature review. Five observable measures

or indicators represent the preverbal domain, six indicators for the receptive domain, five indicators for the expressive domain and two for the vocabulary domain were identified. *Figure 2* summarized the development stage in our study. A total of 25 questions or items from all the 18 indicators are formulated in the item generation stage in the Malay language. In the last step, instrument formation, the domains and items are organized and refined to a suitable format to produce the initial screening tool questionnaire. The screening tool took 10-15 minutes for parents or guardians to answer based on their daily observation of their children aged 18 to 24 months. Likert-scale with 5 point-scale are used for the parent or guardian to rate their daily observation of their children.

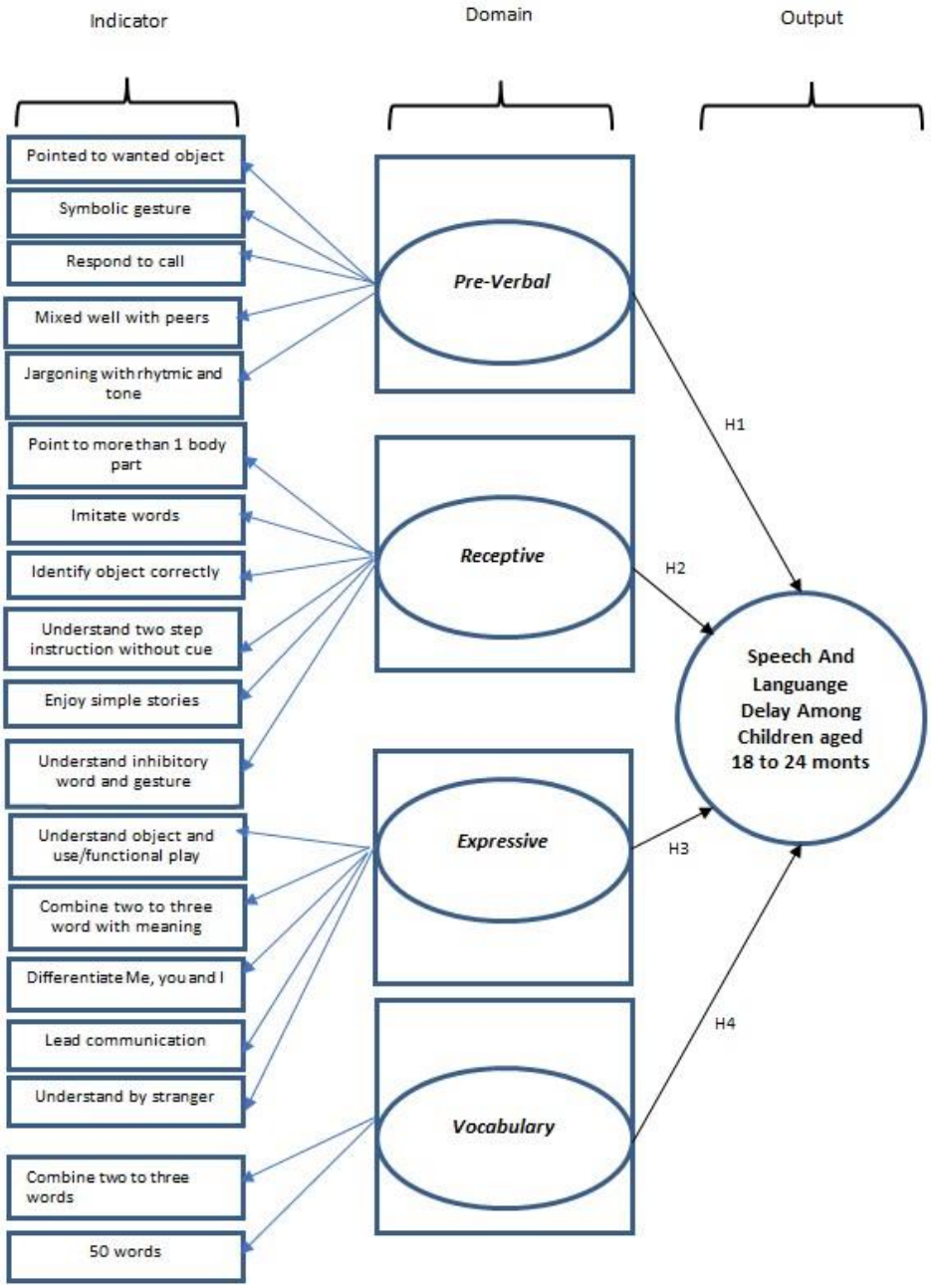

Figure 2. *Domain and indicator identified for speech and language delay in children aged 18-24 months.*

Judgement-quantification stage

Content validation

Feedbacks from all panels of experts were collected. Responses are recorded through a content validation feedback form. Only 14 items with an I-CVI of 1 are retained in the first round of the content validation process. 3 items with I-CVI lower than 0.70 and kappa below 0.60 are eliminated from the screening tool. These items were suggested at least by 2 experts to be removed from the screening tool. Question 3 (Q3) related to child attachment and looking for favourite toys is considered irrelevant to measure pre-verbal domain and child speech and language development. Question 7 (Q7) relates to children jargoning, experts reviewed it as non-discriminatory as children may have jargon up to the age of 3 to 4 years old and thus, unable to differentiate with our target group screening at age 18 to 24 months. Question 18 (Q18) relates to children's ability to differentiate between "You", "Me" and "I" and 2 out of 5 experts believed that the indicator is only valid for screening at the age of 24 to 30 months. 8 items fit revision criteria with I-CVI within 0.70-0.79 and kappa above 0.60. However, three items are eliminated from the screening tool despite having good I-CVI and Kappa. 1 expert strongly rejects these items due to a lack of relevance and essentiality for screening children aged 18 to 24 months and revision is impossible without changing the indicator definition. 4 items underwent minor revision in terms of wording and sentences and 1 item was switched to another domain as the item is irrelevant to measure the previous construct or domain. Regarding S-CVI, the initial screening tool could not meet acceptable values, where the value for S-CVI/AVE at 0.89 and S-CVI/UA at 0.56. Therefore, a second round of content validation was conducted to improve the screening tool. *Table 3* summarized the first round the content validation.

***Table 3**. The relevance ratings on the item scale by 5 expert in the first round content validation.*

Item	E1	E2	E3	E4	E5	EA	UA	I-CVI	pc	MK	Dec
Preverbal											
Q1	1	1	1	1	1	5	1	1	0.031	1	Retained
Q2	1	1	1	1	1	5	1	1	0.031	1	Retained
Q3	1	1	0	0	1	3	0	0.6	0.313	0.418	Deleted
Q4	1	1	0	1	1	4	0	0.8	0.156	0.763	Revised
Q5	1	1	1	1	1	5	1	1	0.031	1	Retained
Q6	1	1	1	1	1	5	1	1	0.031	1	Retained
Q7	1	1	0	0	1	3	0	0.6	0.313	0.418	Deleted
Receptive											
Q8	1	1	1	1	1	5	1	1	0.0312	1	Retained
Q9	0	1	1	1	1	4	0	0.8	0.156	0.763	Revised and changed domain
Q10	1	1	1	1	1	5	1	1	0.031	1	Retained
Q11	1	1	1	1	1	5	1	1	0.031	1	Retained
Q12	1	1	1	1	1	5	1	1	0.031	1	Retained
Q13	0	1	1	1	1	4	0	0.8	0.156	0.763	Deleted
Q14	1	1	1	1	1	5	1	1	0.031	1	Retained
Expression											
Q15	0	1	1	1	1	4	0	0.8	0.156	0.763	Revised
Q16	1	1	1	1	1	5	1	1	0.031	1	Retained
Q17	0	1	1	1	1	4	0	0.8	0.156	0.763	Deleted
Q18	0	1	1	0	1	3	0	0.6	0.313	0.418	Deleted
Q19	1	1	0	1	1	4	0	0.8	0.156	0.763	Deleted
Q20	1	1	1	1	1	5	1	1	0.031	1	Retained
Vocabulary											
Q21	1	1	1	1	1	5	1	1	0.031	1	Retained

Q22	1	1	0	1	1	4	0	0.8	0.156	0.763	Revised
Q23	1	1	1	1	1	5	1	1	0.031	1	Retained
Q24	1	1	0	1	1	4	0	0.8	0.156	0.763	Revised
Q25	1	1	1	1	1	5	1	1	0.031	1	Retained
										S-CVI/Ave	0.89
										S-CVI/UA	0.56
Proportion of agreement	0.8	1	0.76	0.88	1			Ave-proportion of agreement across expert			0.89

Note: E1/E2/E3/E4/E5=Expert 1/2/3/4/5; EQ=Expert in Agreement; MK=Modified Kappa (K); Dec=Decision.

In the second round of the content validation process, a total of 19 questions are rated by five experts. All 19 questions achieved acceptable values for I-CVI, kappa, and S-CVI as seen in the *Table 4*. In summary, out of 25 initial questions, 14 items retained without revision, 5 items retained after revision and 6 items were deleted.

***Table 4**. The relevance ratings on the item scale by 5 expert in the second round content validation.*

Item	E1	E2	E3	E4	E5	EA	UA	I-CVI	pc	MK	Dec
Preverbal											
Q1	1	1	1	1	1	5	1	1	0.031	1	Retained
Q2	1	1	1	1	1	5	1	1	0.031	1	Retained
Q4(revised)	1	1	1	1	1	5	1	1	0.031	1	Retained
Q5	1	1	1	1	1	5	1	1	0.031	1	Retained
Q6	1	1	1	1	1	5	1	1	0.031	1	Retained
Receptive											
Q8	1	1	1	1	1	5	1	1	0.031	1	Retained
Q10	1	1	1	1	1	5	1	1	0.031	1	Retained
Q11	1	1	1	1	1	5	1	1	0.031	1	Retained
Q12	1	1	1	1	1	5	1	1	0.031	1	Retained
Q14	1	1	1	1	1	5	1	1	0.031	1	Retained
Expression											
Q9(revised)	1	1	1	1	1	5	1	1	0.031	1	Retained
Q15(revised)	1	1	1	1	1	5	1	1	0.031	1	Retained
Q16	1	1	1	1	1	5	1	1	0.031	1	Retained
Q20	1	1	1	1	1	5	1	1	0.031	1	Retained
Vocabulary											
Q21	1	1	1	1	1	5	1	1	0.031	1	Retained
Q22(revised)	1	1	1	1	1	5	1	1	0.031	1	Retained
Q23	1	1	1	1	1	5	1	1	0.031	1	Retained
Q24(revised)	1	1	1	1	1	5	1	1	0.031	1	Retained
Q25	1	1	1	1	1	5	1	1	0.031	1	Retained
										S-CVI/Ave	1
										S-CVI/UA	1
Proportion of agreement	1	1	1	1	1			Ave-proportion of agreement across expert			1

Note: E1/E2/E3/E4/E5=Expert 1/2/3/4/5; EQ=Expert in Agreement; MK=Modified Kappa (K); Dec=Decision.

Face validation

Face validation is commenced after content validation is completed. Demography and background of our layperson raters were summarized in *Table 5* and *Table 6*. Malaysia is a unique country with a multiple race and cultures, therefore, having a various background of raters will help to ensure the screening tool can be widely understood by all Malaysians. All the items are retained in the screening tool with 16 item scores I-FVI of 1 and 3 other items score I-FVI of 0.90. S-FVI for the screening tool achieved acceptable values for both S-FVI/AVE at 0.98 and S-FVI/UA at 0.84 as shown in *Table 4*.

***Table 5**. Background for 10 layperson raters invited for face validation study.*

Rater	Gender	Role	Race	Education level	Child diagnose with speech and language delay
R1	Male	Father	Indian	Tertiary	Yes
R2	Female	Mother	Malay	Tertiary	No
R3	Female	Mother	Malay	Secondary	No
R4	Female	Mother	Malay	Tertiary	No
R5	Female	Mother	Malay	Secondary	No
R6	Male	Father	Chinese	Secondary	No
R7	Female	Mother	Indigenous Peninsular Malaysian	Secondary	No
R8	Male	Father	Sarawakian	Tertiary	No
R9	Female	Guardian (Grandmother)	Indian	Primary	No
R10	Female	Mother	Malay	Tertiary	Yes

***Table 6**. The clarity and comprehension rating by 10 layperson for face validation.*

Item	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	EA	I-FVI
Preverbal												
Q1	1	1	1	1	1	1	1	1	1	1	10	1
Q2	1	1	1	1	1	1	1	1	1	1	10	1
Q4(revised)	1	1	1	1	1	1	1	1	1	1	10	1
Q5	1	1	1	1	1	1	1	1	1	1	10	1
Q6	1	0	1	1	1	1	1	1	1	1	9	0.90
Receptive												
Q8	1	1	1	1	1	1	1	1	1	1	10	1
Q10	1	1	1	1	1	1	1	1	1	1	10	1
Q11	1	1	1	1	1	1	1	1	1	1	10	1
Q12	1	1	1	1	1	1	1	1	1	1	10	1
Q14	1	1	1	1	1	1	1	1	1	1	10	1
Expression												
Q9(revised)	1	1	1	1	1	1	1	0	1	1	9	0.90
Q15(revised)	1	1	1	1	1	1	1	1	1	1	10	1
Q16	1	1	1	1	1	1	1	1	1	1	10	1
Q20	1	1	1	1	1	1	1	1	1	1	10	1
Vocabulary												
Q21	1	1	1	1	1	1	1	1	1	1	10	1
Q22(revised)	1	1	1	1	1	1	1	0	1	1	9	0.90
Q23	1	1	1	1	1	1	1	1	1	1	10	1
Q24(revised)	1	1	0	1	1	1	1	1	1	1	10	1
Q25	1	1	1	1	1	1	1	1	1	1	10	1
											S-CVI/Ave	0.98
											S-CVI/UA	0.84
Proportion of agreement	1	0.95	1	1	1	1	1	0.89	1	1	Ave-proportion of agreement across expert	0.98

Developing a new screening tool in the local language to screen speech and language delays in Malaysia is important to benefit children with delays for prompt referral and treatment. Malay is the main language in this screening tool as it is the official language in Malaysia. It has been widely used by healthcare providers in all government health facilities to provide health consultations for patients. We also opt to develop a screening tool based on parent-rated rather than trained-examiner screening tools. The trained examiner screening tool will require a dedicated trained examiner to conduct the screening session or interview, increasing the burden on the healthcare staff. However, a parent-rated screening tool is easier to conduct as it can be done alone by the parent or guardian thus, reducing the workload for healthcare staff. In addition, it also provides greater information about children's speech and language abilities as reported by parents or guardians based on their daily observations of their children. Parent-rated and trained examiner screening tools also share many similarities in performance and sensitivity in

screening speech and language delays in children (Wallace et al., 2015). The newly developed screening tool achieved satisfactory validation through content validation by the experts. This is the initial process invalidity analysis. Although content validity has been widely used for the validation process, it still has limitations. Content validation depends on subjective feedback from the experts. Experts in similar fields of expertise may have different opinions on the same subject matter based on their accumulated experience in managing and treating children with speech and language delays. Therefore, feedback received from the expert may subjected to bias. To minimize this, the selection of experts should have strict criterion selection and the validation process should not stop only at content validation. The next step for validity analyses will involve construct validity, criterion validity and reliability analysis before the screening tool can be used in screening children with speech and language delay.

In the face validation, we aim to ensure that our target group, parents or guardians of children aged 18 to 24 months, can accept the newly developed screening tool. Simplified words, avoiding medical jargon, providing examples relevant to customs and traditions, and minimising questions as much as possible are examples taken by us to ensure the public easily accepts this screening tool. In this face validation test, our screening tool can achieve satisfactory validation done by lay experts from various backgrounds and reflects that Malaysians can easily accept this tool with multiracial and cultural diversity.

Conclusion

The newly developed Parent-rated screening tool for speech and language delay among children aged 18 to 24 months in Malay achieved satisfactory content and face validation.

Acknowledgement

This research study was approved by the UiTM Research Committee REC/08/2022 (PG/MR/170).

Conflict of interest

The authors confirm that there is no conflict of interest involve with any parties in this research study.

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