

Reliability and Validity for Malay Version of Bayley Scales of Infant and Toddler Development–Third Edition (Bayley-III): Preliminary Study

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Abstract. The purpose of this study is to assess reliability and validity of Bayley Scales of Infant and Toddler Development–Third Edition (Bayley-III) in Malay version. This instrument is used to measure infant and toddler’s cognitive development, is comprise of five scales: mental, receptive communication, expressive communication, fine motor and gross motor. Bayley-III was translated into Malay language by using Back to Back Translation procedure proposed by Brislin (1973). Respondents of the present study were 34 infants between the age ranges of 9-13 months. This instrument consists of 17 age groups (A-Q) and for this preliminary study, the group H and I were selected. After reliability assessment by using internal consistency method Alpha Cronbach, it was found that reliability for cognitive scale ($r = .923$), receptive communication scale ($r = .765$), expressive communication scale ($r = .796$), fine motor ($r = .751$), and gross motor ($r = .920$). The results indicated that Bayley-III was high level of reliability in present study. As for convergence study of Bayley-III, it was established significant and positive inter correlation between five sub scales. Findings of the present study showed that Bayley-III can be used in Malaysian context specifically for children in Kota Kinabalu, Sabah, Malaysia.

Keywords: Bayley Scales of Infant And Toddler Development, Reliability, Validity, Infant.

1. Introduction

The Bayley Scales of Infant and Toddler Development–Third Edition (Bayley-III) is a revision of the Bayley Scales of Infant Development–Second Edition (BSID-II; Bayley, 1993). The Bayley-III is an individually administered instrument that assesses the developmental functioning of infants and young children between 1 month and 42 months of age (Bayley, 2006). The revision of the BSID-II was conducted to improve the equality and to enhance the utility of the instrument. While certain aspects of the BSID-II have been altered and new material added, the Bayley-III maintains the original nature an purpose of the Bayley Scales as envisioned by its author, Nancy Bayley (Bayley, 2006).

With Bayley-III, it is possible to obtain detailed information even from non-verbal children as to their functioning. Children are assessed in the five key developmental domains of cognition, language, social-emotional, motor and adaptive behaviour. Bayley-III can be used to identify young children with developmental delay and to assist the practitioner involve in early childhood intervention programs. By administering Bayley-III practitioner can obtain a substantial amount of qualitative and quantitative information with which to compare the child with his or her age mates. Bayley-III identifies infant and toddler strengths and competencies, as well as their weakness. It also provides a valid and reliable measure of a child's abilities, in addition to giving comparison data for children with high-incidence clinical diagnoses. Growth scores can be used to chart intervention progress, and it's useful in programme evaluation, ongoing monitoring of progress and outcome measurement.

This instrument can also serve as a research tool. The BSID II and Bayley-III have been used extensively in research to examine the performance of children in a particular diagnostic group or to track the effects of intervention on children’s development. Although there is wide range of applications for which the Bayley III is well suited, however the question that arises is the practical utility of Bayley-III in terms of its reliability and validity in Malaysian culture.

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Bayley-III like majority of available psychometric tests originated from the western world and was designed to suit the culture, language and socio-economic status of the respective populations. According to De Klerk (2008) in nowadays world, many tests are adapted from one language and culture to another. However, individual scores based on tests supposedly measuring the same construct in various cultures cannot be interpreted at face value. The influence of culture on measuring the specific psychological construct needs to be explored to be able to adjust measurements to make them meaningful to the particular culture and to get equivalent or comparable measures across cultures. So far very few tests have been validated in the developing world.

The two most important and fundamental characteristics of any measurement procedure are reliability and validity of the scales. Any kind of assessment, whether traditional or "authentic," must be developed in a way that gives the assessor accurate information about the performance of the individual. Instruments with higher reliability and validity measures can help in conducting good quality research.

As translation and adaptation are realistic and worthwhile strategies for obtaining valid and reliable cognitive measures in a resource limited setting, the purpose of the present study was to translate Bayley-III in Malay language and determine its reliability and validity, thus making it suitable for being used in Malaysian culture specifically for children in Kota Kinabalu, Sabah, Malaysia.

2. Method

2.1. Research Design

The present research was an exploratory study conducted by administering measures of Cognitive development to the participants of the present study.

2.2. Sample

The sample of the present study consists of 34 infants between the age ranges of 9-13 months, from day-care centres around city of Kota Kinabalu, Sabah, Malaysia.

2.3. The Instruments

Bayley Scales of Infant and Toddler Development (Bayley-III)

The Bayley Scales of Infant and Toddler Development (Bayley-III) developed by Nancy Bayley (2006) was used to assess cognitive development of infants and toddlers between the age range of 1 month to 42 months. Bayley-III consists of 5 subscales i.e. Cognitive Scale, Language Scale (Receptive Communication and Expressive Communication), Motor Scale (Fine Motor and Gross Motor), Social-Emotional Scale and Adaptive Behavior Scale. For present study, Social-Emotional Scale and Adaptive Behavior Scale were excluded.

The Cognitive Scale includes items that assess sensorimotor development, exploration and manipulation, object relatedness, concept formation, memory, and other aspects of cognitive processing. The Bayley-III Language Scale is composed of receptive communication and expressive communication items. The Receptive Communication subtest includes items that assess preverbal behaviours; vocabulary development, such as being able to identify objects and pictures that are referenced; vocabulary related to morphological development, such as pronouns and prepositions; and understanding of morphological markers, such as plural *-s*, tense marking (*-ing*, *-ed*), and the possessive *-'s*. Also included are items that measure children's social referencing and verbal comprehension. However the Expressive Communication subtest includes items that assess preverbal communication, such as babbling, gesturing, joint referencing, and turn taking; vocabulary development, such as naming objects, pictures, and attributes (e.g., color and size); and morpho-syntactic development, such as using two-word utterances, plurals, and verb tense. Motor Scale is divided into the Fine Motor subtest and the Gross Motor subtest. Fine motor skills associated with prehension, perceptual-motor integration, motor planning, and motor speed are included in this subtest. Items measure skills related to visual tracking, reaching, object manipulation, and grasping. The Gross Motor subtest primarily measures the movement of the limbs and torso. Items assess static positioning (e.g., sitting, standing); dynamic movement (e.g., locomotion, coordination); balance; and motor planning (Bayley, 2006).

The measure with a series of developmental play tasks will take between 45 - 60 minutes to administer. Raw scores of successfully completed items was converted to scale scores and to composite scores. The scores obtained by toddlers were used to determine their performance compared with norms taken from typically developing children.

2.4. Procedure

Items with starting point H and I which are suggested to be suitable for infants within the age range of 9 months 0 day to 13 months 15 days were translated to Malay language using Back to Back translation method suggested by Brislin (1973). After seeking the approval from the day care centres, the translated version of items from manual were administered to the participants of the study to collect the data. Data collected was analysed to determine the reliability and validity of Bayley-III.

3. Data analysis

SPSS version 20.0 was used to analyse the data. As for reliability, the scale internal consistency Cronbach Alpha coefficient method was used and for validity, the intercorrelation between subtests was examined.

4. Result and Discussion

4.1. Evidence of Internal Consistency

The evidence for internal consistency of the Bayley Scales of Infant and Toddler Development III (Bayley-III) was obtained using the internal consistency Alpha Cronbach's method. The reliability coefficients for the Bayley-III subtests were presented in Table 1. The overall high reliability coefficients were found for all subtest of Bayley-III. The alpha coefficients range from .753 (Fine Motor) to .921 (Gross Motor) with an overall average internal consistency coefficient of .828. Similar reliability result was obtained by Bayley (2006) in her study. Bayley reported that the overall average reliability coefficients of the Bayley-III subtests range from .86 (Fine Motor) to .91 (Cognitive, Expressive Communication, and Gross Motor). The results indicated that Bayley-III is a reliable tool for the assessment of local children in Malaysia specifically in Kota Kinabalu, Sabah, Malaysia.

Table 1. Reliability Coefficients of The Bayley Scales of Infant and Toddler Development III (Bayley-III) Subtest.

Subtests	Alpha Coefficients
Cognitive	.919
Receptive communication	.769
Expressive Communication	.779
Fine Motor	.753
Gross Motor	.921

4.2. Evidence of Validity

The evidence for validity of the Bayley Scales of Infant and Toddler Development III (Bayley-III) was obtained by examining the intercorrelation between subtests. The subtests were predicted to show some degree of correlation to one another based on the assumption that the subtests designed to measure similar underlying construct. In this study, it was expected that all of Bayley-III subtests would have at least low to moderate significance correlations with each other. It was also assumed that the subtests contributing to a specific scale (i.e., Motor Composite and Language Composite) would have higher correlations with each other than with subtests comprising other scales.

Table 2 showed the results intercorrelation of the subtests. As expected, the subtests that compose the Language Composite correlate higher with each other than with either of the subtests comprising the Motor Composite. In addition, the Language subtests are moderately to highly correlate with the Cognitive subtest, with moderate correlations seen between the Motor subtests and the Cognitive subtest. This is likely due to the stronger relation between language skills and cognition than between motor skills and cognition. The results supported a prior assumption about the pattern of the relations between subtests and provided evidence of convergent validity of this test.

Table 2. Intercorrelations of the Subtests of Bayley Scales of Infant and Toddler Development (Bayley-III)

Subtest	Cognitive	Receptive Communication	Expressive Communication	Fine motor	Gross motor
Cognitive					
Receptive Communication	.587**				
Expressive Communication	.441*	.560**			
Fine motor	.418*	.357*	.428*		
Gross motor	.435*	.422*	.496**	.570**	

** p < .001

*p < .05

5. Conclusion

This study has demonstrated a high reliability for all subtests of the Bayley Scales of Infant and Toddler Development III (Bayley-III). This study also has demonstrated a good convergent validity for the subtests. The results indicated that Bayley-III is a reliable and valid tool for the assessment of local children in Malaysia specifically in Kota Kinabalu, Sabah, Malaysia.

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