SHORT COMMUNICATION

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Cultural Adaptation, Validity and Reliability of Kannada Version of Affordances in the Home Environment for Motor Development-Infant Scale (AHEMD-IS): A Cross-Sectional Study

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Abstract

Background: It has been demonstrated that a child's home environment plays a significant role in motor development, particularly in infants. Since it is common practice in physical therapy to give patients advice on activities to do at home, investigating the home environment can have significant effects on the intervention. The Affordances in the Home Environment for Motor Development – Infant Scale (AHEMD-IS) is an instrument that has been created to evaluate the home environment. **Objective:** The purpose of this study was to translate, culturally adapt, and find validity and reliability of the Kannada version of AHEMD-IS. **Methods:** The original English version was translated into the Kannada language through the process of steps. 61 mothers of normally developing infants were included in this study. **Result:** The cross-cultural adaptation method perfectly matched the content or language. Internal consistency (Cronbach's alpha) was 0.80 for the age group 3-11 months and reliability of 0.91 for the age 12-18 months of age. **Conclusion:** When evaluating the home environment of Kannada-speaking populations, the final result is a valid and reliable trustworthy instrument. The Kannada version of the AHEMD-IS demonstrated good internal consistency and comparability with similar studies in different languages.

Major Findings: The Kannada version of AHEMD-IS is a reliable and valid tool to assess the motor development affordances in the home environment

Keywords: AHEMD-IS, Cultural Adaptation, Kannada, Reliability, Validity

1. Introduction

Gross motor skills are the first motor skills to be developed in an infant and are important to aid in developmental functions such as perceptual and cognitive abilities, physical health and social adaptation. To explore and learn about surroundings, motor development is must, which is influenced by variety of factors[1,2]. Environmental influences are considered crucial factor for optimal growth and development[3]. Given that infants tend to spend most of their time at home during the first year of life, this environment becomes a crucial factor for motor development[4]. According to current theories of early motor development, new motor skills results from interaction between an infant and the environment and the process of exploring movement options[5]. The ecological theory, which emphasises the link between perception and action, takes into account the relationship between the environment and the individual[6].

The home affordances can be instrumental in stimulating motor development[7]. Opportunities providing a person with the chance to take action that ultimately resulted in learning and the acquisition of a skill or the development of a biological system component are referred to as affordability[8]. Research on the connection between motor development and the home environment

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has received a lot of attention lately[9]. Recently when considering environment, the "home" environment has been given more emphasis[5]. The child's development may be aided or hindered by their home environment. The primary affordances of a home are its architecture, its physical layout, and its variety of toys[10]. In this perspective, different scales like Home Observation Measurement of the Environment (HOME), Multiple Index Cluster Survey (MICS), Early Child Developmental Index (ECDI), Affordances in the Home Environment for Motor Development (AHEMD-IS) were developed to assess the home environment[5]. Research utilizing the AHEMD-IS has demonstrated a positive relationship between motor affordances and motor ability, cognition, and behavior[11]. AHEMD-IS has been recently added as a supporting tool in a major study designed to measure intra-uterine growth[10]. To this date AHEMD-IS has been translated from its standardized English version into different languages (Spanish, Portuguese, Japanese, Persian, *etc.*)[12]. The AHEMD-IS (version 3-18 months) was created to evaluate the quality of the family context with regard to possibilities for motor development, the physical features of the home, the regular activities provided by the people who engage with the children, and the availability of toys that are appropriate for their age[13]. As the availability of the instrument in the native languages makes understanding of the instrument easy and reliable and removes the error of language barrier it should be translated in languages known to people for accurate interpretation. Before any tools are used in a country other than where it is developed, it is important to culturally adapt the tool to the region where it is used[14]. India is a multilingual country, in which people may experience difficulties in understanding English questionnaires and scales due to factors like education, socio-economic status, lack of awareness of child development, *etc*[13]. The language of the questionnaire can have an effect on the scores based on the way the people understand the questions[15]. Thus, the need arises to translate the scale into regional languages. Kannada is one of the 40 most spoken languages in the world, and roughly 40 million native speakers speak it[15]. Moreover, there is no evidence of the AHEMD-IS being translated into Kannada, one of India's widely spoken regional languages. Therefore, this study aims to translate and culturally adapt the AHEMD-IS into the Kannada language.

2. Methods

The creation of the Kannada version of the AHEMD-IS was conducted in the following four phases.

Phase 1. Translating the Questionnaires

The protocol for the International Quality of Life Assessment (IQOLA) was used to translate the two questionnaires. First, a translator who was also an expert in child-related activities (physical therapist) translated the original version into Kannada. After the forward translation was finished, the Kannada translation was combined, and a single translation was made for each questionnaire. An expert in English translation then performed a back translation of the Kannada translation into English. At long last, both back-translated were combined. A group of experts discussed and compared the final questionnaires to the earlier versions until a consensus was reached.

Phase 2. Investigating Cultural Adaptation

An expert panel consisting of an occupational therapist and a physical therapist discussed cultural adaptation issues. Members of the panel examined each sentence for sentence fluency and Kannada grammar and expressions. The ethnicity question was removed from the translated version for cultural adaptation, and the type of house and education level of parents were adjusted based on Indian background and Indian socioeconomic status.

Phase 3. Investigating the Content and Face Validity

Three experts in child development who took part in the cultural adaptation phase were given questionnaires to fill out in order to check the validity of the content. Ten mothers with infants ranging in age from 3-18 months were provided with questionnaires for the purpose of assessing face validity. Participants were questioned about their comprehension of each question and the instructions in person and in groups.

Phase 4. Assessing Reliability

Based on the opinions of experts and mothers, the questionnaires fluency and understandability were verified and adapted to Indian culture. Prior to commencement, ethical approval was obtained from the Research and Ethics Committee of KAHER Institute of Physiotherapy, Belagavi, India. This study was registered under CTRI (CTRI/2023/07/055421). The study included 60 mothers of children aged 3 to 18 months. They were included in a tertiary care hospital in Belagavi, India. Mothers of normally developing infants whose language of communication is Kannada and who can read and

write in Kannada were included in this study. This study did not include parents whose children were diagnosed with a disability, chromosomal abnormality, metabolic disease, congenital anomalies, or neuromotor disease, or to have been born prematurely.

3. Measures

Affordances in the Home Environment for Motor Development- Infant Scale (AHEMD-IS). The original English version of this instrument has been reported as a valid and reliable self-report questionnaire for evaluating the home environment by parents in children 3 to 18 months. Scoring information is available for two age groups: Groups of 3 to 11 months and 11 to 18 months. There are four subtests including; Physical Space (PS) in inside space and outside space parts, Variety of Stimulation (VS), Fine Motor Toys (FMT), and Gross Motor Toys (GMT) used to assess the home as 'excellent', 'adequate', 'moderate adequate' and 'less than adequate'.

4. Data Analysis

The reliability of AHEMD-IS was evaluated using the Cronbach's alpha coefficient. Values below 0.21 and 0.40 were considered reasonable, values between 0.41 and 0.60 were considered moderate, values between 0.61 and 0.80 were considered substantial, and values between 0.81 and 1.0 were considered almost perfect.

5. Results

Table 1. Descriptive statistics of continuous variables family and child

(n = 61)	Range	Mean±S.D.
Age (Months)	3 to 17	7.2±3.0
Birth weight (Kg)	2.6 to 3.5	3.0±0.2
Mother's age (yrs)	19 to 48	30.0±5.8
Father's age (yrs)	22 to 51	33.4±6.0

Kg= kilogram, yrs= years, n= number of participants

Table 2. Descriptive characteristics of categorical variables of family and child

(n=61)		Frequency	%
Pre Term	0	61	100
Gestational Age (wks)	37 weeks	61	100
Children Attending Childcare	0	61	100
House Type	Kaccha house	7	11.5
	Pakka house	40	65.6
	Apartment	12	19.7
	Bungalow	2	3.3
Number of Adults Living in a Home	2	7	11.5
	3	15	24.6
	4	24	39.3
	5	15	24.6
Number of Children Living in a Home	1	13	21.3
	2	29	47.5
	3	15	24.6
	4	4	6.6
Number of Bedrooms	1	2	3.3
	2	6	9.8
	4	53	86.9
Stayed at House	Less than 3 months	3	4.9
	3-6 months	19	31.1
	7-12 months	32	52.5
	More than 12 months	7	11.5
Father's Education	Can read and write	9	14.3
	12^{th} pass	30	49.2
	Graduate	18	29.5
	Postgraduate	4	6.6
Mother's Education	Uneducated	49	80.3
	Can read and write	2	3.3
	12^{th} pass	8	13.1
	Postgraduate	2	3.3

Wks= weeks, n= number of participants

Descriptive characteristics indicated that there were no children who were attending daycare. 65.6% lived in apartments, and 3.3% lived in bungalows. 53% of houses had 4 bedrooms. 24% of the families constituted 4 adults living in the house and 7% with only 2 adults living in the house. For parental education, 30% of the fathers were 12th pass and 4% completed post-graduation. 49% of the mothers were uneducated whereas only 2% had completed their post-graduation.

5.1 Cultural Adaptation

Questions concerning ethnicity were removed. The section addressing house type and parents education was altered in accordance with Indian socio-economic status.

5.2 Content-Related Validity and Face Validity Evaluation

The questionnaire's content validity was evaluated after the experts filled out a form. The findings demonstrated that the experts concurred with the items and instructions criteria. Also taken into consideration were comments regarding particular dimensions and questions. The questionnaire's overall structure remained unchanged and was unaffected by the changes. To determine the questionnaire's content validity, CVR and CVI were calculated. For the AHEMD-IS S-CVI was 0.95, while the I-CVI was 0.91.

Face validity was established in the Kannada version of the AHEMD-IS and was considered adequate *i.e.,* the content of the translated items was understandable and easily comprehensive to the mothers. Thus, the AHEMD-IS Kannada adaptation scored exceptionally high for these characteristics.

The reliability of AHEMD-IS for the Kannada version was assessed using Cronbach's alpha coefficient. In terms of Cronbach's alpha values of reliability, the lowest values for reliability appeared for the age group 3-11 months in the component of gross motor toys (0.71) and the highest was for the component of a variety of stimulation (0.77). The overall reliability was 0.80 which is substantial. Conversely, the lowest reliability value for the age group 12-18 months was observed in the component of the variety of stimulation, and the highest was observed in the component of gross motor toys (0.89) and with an overall reliability of 0.91, considered almost perfect.

6. Discussion

The aim of this study was to translate, cross-culturally adapt, and validate a reliable Kannada version of the AHEMD-IS, specifically designed for the Kannada-speaking population in India. Through a four-step process, we developed AHEMD-IS (Kannada) questionnaire. Our results show that the Kannada-translated version of AHEMD-IS is a valid and reliable instrument for assessing the home environment of Indian children. The Cronbach's alpha for AHEMD-IS (Kannada) is within an acceptable range of 0.71 to 0.89 for all subtests. Additionally, the Cronbach's alpha for the total score in the current study was 0.80 for children aged 3-11 months and 0.91 for children aged 12-18 months.

The Kannada version of the AHEMD-IS questionnaire demonstrates good internal consistency, with alpha values ranging from 0.71 to 0.89 for the subtests, which falls within the range of the original questionnaire[6]. In the current study, the questionnaire showed substantial to excellent reliability for both age groups, indicating that the tool is highly reliable. The reliability findings were consistent with the original questionnaire (0.93) and similar to other versions of AHEMD-IS such as Persian (0.75), Portuguese (0.77), and Turkish (0.83)[16-18].

Table 3. Reliability analysis

Kannada	Age: 3-11 Months		Age: 12-18 Months	
	Number of Items	Cronbach's Alpha	Number of Items	Cronbach's Alpha
Physical space	7	0.72	7	0.81
Variety of stimulation	8	0.77	8	0.77
Gross motor toys	6	0.71	9	0.89
Fine motor toys	5	0.74	11	0.86
Overall	26	0.80	35	0.91

In our cultural adaptation, we included toys that are used by children in specific contexts. We achieved higher reliability for a variety of stimuli. However, the gross motor toys exhibited lower reliability for the 3-11-month questionnaire. This difference could be attributed to the variability in infants engagement with specific toys during this stage. In the present context, we found that although the toys were available in the house, there was a lack of exposure to toys specifically designed for gross motor skill development at this age due to the overprotective behavior of the parents, which aligns with the study's findings that most parents decide on the play materials for their children[19]. Comparably, a study conducted in the same setting in South India discovered that the presence of play materials was linked to the infant's gross motor development. Children who were not exposed to a variety of play materials showed lower motor development compared to those who had such exposure[20].

The component of variety of stimulation showed higher reliability for age group 3-11 months. By the time a child is 6 months old, they start crawling and creeping, which allows them to explore different types of movement. This period is crucial for their physical development and growth, as they become more mobile and can freely explore their environment[21]. This increased variety of stimulation at this age is more reliable, possibly due to the child's increased movement and exploration which is in line with the findings of another study which concluded that more high-quality stimulation at home affected infants motor abilities who were older than six months old. Older infants have greater motor abilities and so investigate their surroundings more, which makes these results conceivable[22].

In contrast, for the 12-18 month age group, the component of a variety of stimulation demonstrated the lowest reliability value, while the component of gross motor toys exhibited the highest reliability value. The reliability of various types of stimulation was lower, which contradicts the idea that young infants receive less stimulation than older infants. This is partly because the bodies of older infants, aged 12-18 months, are capable of rapid attainment of major milestones, such as walking. So the component of VOS should have been higher in this age group. However, the low reliability likely relates to the two types of responses on the eight items on a variety of stimulation subsets, which could affect the low level of reliability. Similar findings were seen in a study conducted with Iranian children aged 18-42 months[23].

For the subset of gross motor toys, the reliability was higher in the age group 12-18 months which is explanatory that as the age progresses the children experience significant advancements in their gross motor skills. They become more mobile, develop better coordination, and exhibit more refined motor control. These developmental changes may result in more consistent responses to gross motor toys as they engage with them in a purposeful and coordinated manner. As infants progress through their motor development, they may start exhibiting preferences for specific types of gross motor toys[24]. For example, they may show a preference for toys that involve walking, climbing, or pushing. These preferences can result in more consistent responses and interactions with those specific toys, leading to higher reliability scores for the gross motor toys subset.

We believe that the Kannada version of the AHEMD-IS questionnaire is an important tool for the evaluation of the home environment affecting the motor development of Indian children.

The cultural adaptation, reliability, and validity of the Kannada version of the AHEMD-IS have significant implications for both research and clinical practice. This validated tool can now be used to assess the impact of the home environment on motor development among Kannada-speaking infants. Researchers and practitioners can utilize the scale to identify areas of intervention and design effective strategies to promote optimal motor development in this population.

6.1 Limitations

This study is not without limitations. First, the sample size was relatively small, which may limit the generalizability of the findings. Future studies with larger and more diverse samples are warranted. Second, the study design was cross-sectional, which restricted our ability to establish causality or track developmental changes over time. Longitudinal studies are recommended to further validate the scale's utility. Finally, potential biases, such as social desirability or recall bias, may have influenced participants responses and, consequently, the scale's results.

6.2 Future Scope

Future studies should focus on expanding the sample size, conducting longitudinal research, and exploring

the relationship between the AHEMD-IS scores and developmental outcomes.

6.3 Conclusion

In conclusion, this study successfully culturally adapted the AHEMD-IS into the Kannada language, established its reliability, and assessed its validity. The Kannada version of the AHEMD-IS demonstrated good internal consistency, validity, and comparability with similar studies in different languages. The availability of a valid and reliable tool for assessing motor developmental affordances in the home environment among Kannada-speaking infants has important implications for research and practice in this field.

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