

## **A Pilot Study for Extracting Psychometric Properties of an Adapted Jordanian Version of the Parents ' Evaluation ODF Developmental Milestones (PEDS:DM)**

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### **Abstract**

*This study aimed to extract the psychometric properties of a Jordanian version of the Parents Evaluation of Developmental Status: Developmental Milestones (PEDS:DM) to present a psychometrically reliable Arabic scale that benefits the Jordanian context as an effective childhood intervention scale. The validity of the scale was achieved in three ways: Face, construct, and concurrent validity. Face validity was accomplished through the translation steps. As for construct validity; the internal consistency of the translated version was checked. The correlation between the items and sub-scales was high, which indicated high construct validity. Lastly, the concurrent validity was obtained by calculating the Pearson correlation between the Arabic version of the PEDS:DM and the Preschool and Kindergarten Children's Performance scale (PKCPS). The significance of correlated validity for the domains of the scale was as follows: Cognitive (0.79), physical (0.83), social (0.82), and total score (0.84). The indicators of reliability were extracted in two ways: The scale's test-retest reliability, and the internal consistency reliability. The values of the coefficients of reliability for the test-retest ranged between (0.88-0.92) for the different domains, and (0.91) for the total mark. The coefficients of reliability for internal consistency using Cronbach's Alpha had values between (0.82-0.91) for the different domains, and (0.89) for the total mark. Consequently, the Jordanian version of the PEDS:DM is psycho-metrically valid and reliable. As a result, this scale is one of the first instruments that can be implemented safely in the Jordanian context to achieve early detection of any developmental delays in children.*

**Keywords:** *Psychometric Properties, Parents Evaluation of Developmental Status: Developmental Milestones (PEDS:DM), Jordanian Version, Childhood Intervention, Educational Measurement, Developmental Delay among Children.*

## **Introduction**

Young children develop rapidly, and development can be defined, in part, as the process of change in an individual over time. Children of the same chronological age are not necessarily at the same stage or level of anticipated development, possibly because they mature at different rates and have different experiences and opportunities (Wortham, 2008). According to Coghlan, King, and Wake (2003), approximately 20% of young children have significant problems in one or more areas of their development-physical, social, and emotional. It is generally accepted that early detection and intervention lead to a broad range of better outcomes for affected children and their families. Developmental delays in many children are not detected at an age when intervention might be expected to be most beneficial.

Early intervention is important as it has been shown to improve cognitive and other developmental outcomes, which later translate to greater academic achievement, less grade retention and need for special education, lower drop-out rate, and higher college enrollment (Glascoe, 2000). Furthermore, early intervention has proven to improve family functioning and interaction which results in beneficial outcomes for society (Thomas, 2016).

According to Delaney and Smith (2012), both physical and mental health problems in early childhood lead to poorer adult health. Those who are unidentified as having developmental difficulties until school age do not receive the benefits associated with early intervention services. Recent research continues to support the critical need for early intervention (Spittle, Orton, Doyle, & Boyd, 2007; McCormick et al., 2006).

To meet the goal of intervention the assessment process is designed to gather relevant behavioral information (Dawson & Guare, 2004). Wortham (2008) asserts that the importance of assessment includes identifying special needs, supporting the learning process, and evaluating special programs. In early childhood the assessment process involves more than just testing. It includes many strategies that uncover the understanding and determine the development of individual children (Brewer, 2004). Thus, the purpose of assessment is to benefit the child, and the purpose of evaluating infants and toddlers is generally to determine whether the child is developing normally or showing delay that requires a need for assistance or support (Wortham, 2008). Attaining a comprehensive assessment of a child's development requires many procedures. The process needs clear identification of outcomes, adequate analysis of data, and deep reflection on the results (Alade & Buzzetto-More, 2006).

The process of assessing child development is usually conducted using conventional, norm-referenced testing practices to determine whether young children might be experiencing developmental delay. Conventional tests have been neither developed for, nor field-validated on infants, toddlers, and preschoolers with developmental disabilities (Neisworth & Bagnato, 2004). In carrying out early childhood screening, it is important to gather information regarding young children's natural behaviors as they occur in their daily routine. This systematic process is called authentic assessment, which provides insights about the performance of the child and his or her social, physical, and intellectual characteristics and needs (Ricketts, 2006).

Even though many professionals rely upon conventional norm-referenced testing in their work with children, that the implemented traditional intelligence tests, even by

specially-trained preschool psychologists, fail to accomplish the major purpose of assessment for early intervention (Bagnato, 2007). Conventional tests and testing practices fail to be useful for early childhood intervention for two essential reasons. The first reason is that they require situations and behaviors that are separated from the child's natural developmental ecology. Furthermore, they fail to enable success in planning beneficial goals and programs for children. Therefore, comprehensive assessment in early childhood must have immediate and continuous benefits for the child in terms of planning programs and interventions that work (Bagnato, 2007).

Early childhood assessment is a flexible and collaborative decision-making process. In this process, parents and professionals repeatedly revise their judgments to reach a consensus about the needed developmental outcomes and the required types of services that are functional and family-centered (Bagnato & Neisworth, 2004; Snow, 2008). According to Bagnato (2007) there are two fundamental tenets of successful authentic assessment of children. The first is that assessment contexts, content, and procedures must be developmentally appropriate for children. The second is that there must be a successful cooperation with parents and primary caregivers. Parents' involvement is crucial because they provide data that cannot be obtained without their participation (e.g., sleep patterns, social skills, difficulties in community settings, and toileting behavior). Authentic assessment requires adequate training for early childhood professionals to enable them to observe and record the required data and information (Ricketts, 2006).

A critical piece of the Informal Assessment Measurement process, when assessing a youngster's development, is to gather information from those who know the child best, usually parents and teachers (Dawson & Guare, 2004). Asking parents specific questions regarding their child's behavior can yield information that is invaluable, as parents do not necessarily differentiate between a child's behavior and their development, which allows for a unique perspective. Developmental delays often manifest themselves through the behavior of the child (Glascoe, 2000; Sices, Feudtner, McLaughlin, Drotar & Williams, 2003). A recent trend in developmental screening attempts to address the number of very young children who fail to be identified as having developmental difficulties, alleviating the burden by physicians using the information reported by parents (Dawson & Guare, 2004).

### **Rationale and Purpose of the Study:**

In 2003, the Ministry of Education (MoE) in Jordan announced an initiative that is entitled: Education Reform for the Knowledge Economy (ERFKE). The main goal of this initiative was to promote the quality of the teaching process at all levels of early childhood education (Abu-Jaber, Al-Shawareb, & Gheith, 2010). Accordingly, a team for Early Childhood Development (ECD) was assigned. The team completed an extensive strategy document that analyzed and provided an overview of the current situation of young children in Jordan. One of the urgent topics that was highlighted in this document was the need to gather adequate information regarding child development and parents' involvement (UNICEF, 2003).

Therefore, the purpose of this study is to obtain and provide an Arabic Jordanian version of an adequate tool for Surveillance and Screening. Specifically, the selected tool is the PEDS:DM that is culturally aligned with the Jordanian culture and psychometrically valid and reliable. The PEDS:DM, Parents Evaluation of Developmental Status: Developmental Milestones, is a tool for Surveillance and Screening, developed by Glascoe and Robertshaw (2010). The PEDS:DM is a fast, brief, flexible, reliable and accurate indicator of children's skills across developmental domains that contains six to eight items per encounter or age level. It is designed for children zero to 7 years and 11 months, with additional measures for older children and adolescents. Further information on this scale will

be presented in the scale's description section.

### **Literature Review of PEDS Instrument:**

The importance of the PEDS questionnaire was investigated in previous literature. For example, a study was conducted by Coghlan, King, and Wake (2003), in which complete parent and caregiver PEDS data were available for 262 children (67% response: 47% boys; 53% girls) aged from 18 months to 5 years and 9 months. Most parents found the PEDS questionnaire was easy to complete (98%) and likely to be useful to health professionals (89%). Twenty-four children (9%) were classified as being at high-risk for disabilities and 49 (19%) were classified as being at medium-risk of disabilities.

The PEDS has been found acceptable to parents of Australian preschool children, with a prevalence of significant concerns (i.e. children at high and medium risk of developmental problems) similar to those in the USA (Coghlan, King, & Wake, 2003). Cox, Huntington, Saada, Epee-Bounya and Schonwald (2010) conducted a study that aimed to better understand the utility of using the Parents' Evaluation of Developmental Status. 752 PEDS forms, for children aged 6 months to 9 years, and 3 to 5 years were reviewed. Ninety percent of the parents endorsed at least one concern and parents qualified 27.5% of their concerns with a written comment. In 23.9% of cases in which parents identified a concern and provided a written comment, the content of the comment did not match the question's intent; rates of mismatch were similar for the English and Spanish forms. Among comments regarding behavioral concerns, 12% reflected a misunderstanding of age-appropriate behavior. Medical concerns accounted for 14.1% of the comments. More than a quarter of the comments reported behavior or development that was on target or advanced for the child's age.

Limbos and Joyce (2011) investigated the developmental screening measures; the Ages and Stages Questionnaire (ASQ) and the Parents' Evaluation of Developmental Status (PEDS). These measures of children's development were presented to their primary care providers. A sample of 334 children aged 12 to 60 months was recruited. Parents completed the PEDS and the ASQ in their home or the primary care clinic of one of the investigators. The mean age of the children was 32.3 months. Developmental delay was identified in 34 children (10%). The findings highlighted that the PEDS had moderate sensitivity (74%) but low specificity (64%), comparatively. Thus, the PEDS has reasonable scale characteristics for developmental screening in primary care settings.

Moreover, Bedford, Walton, and Ahn (2013) aimed to identify existing outcome measures to assess the development of children aged between 2 and 2.5 years in several developmental domains including the cognitive, physical, and social aspects. Starting from 35 measures which met the inclusion criteria of the study, two measures: the ASQ and PEDS:DM satisfied the requirements best. The study further affirmed the validity and reliability of the scales in reference to the measure itself, as well as the expert advice of various researchers including the authors of the PEDS:DM. Finally, the review referred to another review by Halle (2011) which compared the PEDS to 14 other developmental assessments and found it to compare well.

## **Methods**

### **Setting and Participants**

In order to extract the psychometric properties of a Jordanian version of the Parents Evaluation of Developmental Status: Developmental Milestones (PEDS:DM), one hundred and twenty-eight children four to seven years old were selected randomly from private schools. The final version of the translated scale was administered to these 128 children

through the parent's evaluation of their own children.

## **Procedure and Measures**

### *Description of the Original Scale*

Each item in the PEDS:DM accesses a different developmental domain: expressive and receptive language; fine and gross motor; self-help; social-emotional; and for older children, academic and pre-academic skills. It can be administered by parental report or directly to children. The scale takes less than five minutes to administer and one minute to score using the laminated book of scale items. It is highly accurate: sensitivity and specificity range from 70% to 95% across domains and age levels.

Items on the PEDS:DM were drawn from standardization and validation studies of two diagnostic-level instruments, the Inventory of Early Development II and the Comprehensive Inventory of Basic Skills-Revised. A total of 112 items met selection criteria, resulting in one item per domain per age level (grouped in one to three-month intervals in the first and second years of life, and in four to six-month intervals up to five and a half years of age, and semi-annual intervals thereafter). Domains included fine motor, including written language (in older children), self-help, gross-motor, expressive language, receptive language, social-emotional, and, for older children, maths and reading. Thus, at each age level, six to eight items, one per domain, were included in the final selections. In some domains, especially with older children, there were either no items available or those that were available failed to discern problematic from average performance. In these cases, some domains were dropped after certain ages (e.g. gross motor for children four and a half years of age and older).

The accuracy of the PEDS:DM according to developmental areas in identifying performance in the same domain on the IED-II/CIBS-R was as follows: Fine Motor Domain (Sensitivity of 86%, Specificity of 81%); Gross Motor Domain (Sensitivity of 87%, Specificity of 82%); Expressive Language Domain (Sensitivity of 83%, Specificity of 86%); Self-Help Domain (Sensitivity of 88%, Specificity of 87%); Receptive Language Domain (Sensitivity of 81%, Specificity of 86%); Social-Emotional Domain (Sensitivity of 75%, Specificity of 85%); Academic/ Pre-academic Domain (for children 39 months and older with maths and reading combined) (Sensitivity of 80%, Specificity of 82%); and Total Domain (Sensitivity of 83%, Specificity of 84%).

Guttman's Lambda coefficient was used to view the internal consistency of the PEDS:DM. Across domains this produced a value of (.98). The finding illustrates that items within each domain of the PEDS:DM cluster to form a distinct and cohesive set of developmental skills. Test-retest reliability (meaning that the same examiner retested the child within one week) produced agreement of (.98) and (.99) on a sample of 75 children who were re-administered the entire IED-II or CIBS-II. Inter-rater reliability, across two different examiners retesting a sample of 77 children, revealed agreement of (.82) to (.96) across subtests. Of the 112 items on the PEDS:DM, 67 were standardized both by parental report and by examiner administration. On these, kappa was (.81) indicating a high level of concordance between parent administration and direct administration by professionals or paraprofessionals.

Analysis of readability was conducted for items on each form of the PEDS:DM. Because readability formulas depend in part on sentence length, inclusions of the short phrases used as response options can produce a reading level result that is lower than in actuality. With response options excluded, the Flesch-Kincaid index produced a reading level of (1.8) grades (range 1.1-2.6), well within the recommended readability recommendations for parent-oriented medical literature.

## **Translation Steps**

### *Primary Translation*

Authors of the study have directly contacted PEDS Inc. to obtain permission of use, and started the translation process from English into Arabic, taking into account that the translation needs to be similar to the original version in terms of language (vocabulary), meaning, and content aspects; as well as being culturally appropriate for the Jordanian culture. In this regard, the scale was translated word by word and item by item. Then, the translation was informally reviewed by two professors working at the University of Jordan, who are proficient in both languages. Their comments were obtained with regard to the translation content, cultural appropriateness, and resemblance to the original scale. Minor adjustments (basically related to vocabulary choice) were recommended and applied to the translation.

### *Formal Revision*

Four faculty members in the Departments of Curriculum and Instruction, Counselling and Special Education, and Educational Psychology at The University of Jordan, reviewed the primary translation individually, according to the following criteria: (a) the linguistic correctness (word by word translation/vocabulary correctness) of the translation in comparison to the English version; (b) the content resemblance (Each item in the translated version should be similar to the one in the original version in terms of content, meaning, and the purpose of measurement of the item; the total number of items should be similar to the ones in the original version; the total number of subscales and the sequential of subscales should be similar in both versions; and completion directions should also be similar in both versions); (c) the cultural appropriateness of each item's content for the Jordanian culture; and (d) the comprehensibility and clarity for its targeted populations. All comments made by the reviewers were mainly related to improving and modifying the readability of the items included in the translation. All of these comments were taken in consideration and modifications were made on the translated version.

### *Back Translation (from Arabic to English)*

Back translation is another procedure to assure the translation correctness and the ability to match the original version. A faculty member, who is proficient in Arabic and English, in the department of Educational Psychology/College of Education at The University of Jordan, translated the translation back from Arabic to English. This back-translated version, then, was compared with the original English version item by item to ensure that it was similar to the original one.

### *Final Version*

As a result of the previous steps, the final translation of the PEDS:DM into Arabic was obtained. Finally, an Arabic language teacher reviewed the final translated version for the purposes of checking the Arabic language accuracy (syntax accuracy). A few grammatical corrections were made, without impacting the meaning, for the purpose of satisfying the correct Arabic language grammar criteria.

## **Validity Indicators**

The validity of the PEDS:DM scale was achieved in three ways. The methods included face validity, concurrent validity, and construct validity. The following paragraphs describe each of these methods.

- Face validity that was accomplished through the previously mentioned translation steps.

- Concurrent validity was obtained by calculating the Pearson correlation between the Arabic version of the PEDS:DM and the Preschool and Kindergarten Children's Performance scale (PKCPS) which was established and developed by Al-Batch (2001). The PKCPS (Al-Batch, 2001) consisted of 50 behavioral aspects, which cover ten sub-areas, within three main domains of growth: cognitive, physical and social. Each of these domains has been embedded within a number of sub-areas.
- Construct validity: the internal consistency of the translated version was checked through calculating the correlation coefficient between the sub-scales forming the PEDS:DM, and the total score of the scale. Table (1) shows the results of these computed correlations.

**Table 1. Correlation coefficient between the sub-scales forming the PEDS:DM, and between the total score of the scale**

	Item No.	Sub-scales	Total Score
Fine Motor	A1	.303**	0.097
	A2	.645**	0.061
	A3	.716**	0.002
	A4	.709**	-.048-
	A5	.669**	0.089
	A6	.721**	-.049-
	A7	.725**	-.082-
	A8	.611**	0.112
Self Help	B1	.464**	-.117-
	B2	.218*	0.09
	B3	.485**	0.093
	B4	.360**	0.066
	B5	.408**	-.093-
	B6	.545**	.235**
	B7	.379**	0.097
	B8	.325**	-.033-
	B9	.434**	-.068-
	B10	.420**	0.173
Receptive Language	C1	.355**	0.046
	C2	0.075	0.064
	C3	0.076	-.181-*
	C4	.299**	-.097-
	C5	.202*	0.031

	C6	.393**	0.038
	C7	.359**	-.173-
	C8	.612**	0.002
	C9	.726**	0.01
	C10	.569**	.248**
	C11	.555**	0.16
Expressive Language	D1	.446**	0.101
	D2	.384**	0.008
	D3	.606**	0.121
	D4	.544**	-.004-
	D5	.624**	.177*
	D6	.400**	0.019
	D7	.588**	0.021
	D8	.606**	0.173
Gross Motor	E1	.669**	0.054
	E2	.460**	-.037-
	E3	.473**	0.104
	E4	.254**	-.064-
	E5	.729**	0.171
Social Emotional	F1	.247**	-.127-
	F2	.236**	-.139-
	F3	.402**	0.111
	F4	.381**	-.037-
	F5	.328**	0.027
	F6	.503**	0.018
	F7	.375**	-.081-
	F8	.623**	-.021-
	F9	.567**	0.028
	F10	.505**	.180*
Academic	G1	-.085-	-.062-
	G2	.367**	0.035
	G3	.466**	-.048-
	G4	0.119	0.002
	G5	.386**	-.019-
	G6	.421**	0.104

	G7	.596**	0.04
	G8	.476**	0.109
	G9	.525**	.223*
	G10	.607**	0.034
	G11	.789**	.176*
	G12	-.445**	-.101-
	G13	.777**	0.121
	G14	.755**	.212*

\*\* Correlation is significant at the 0.01 level (2-tailed).

\*Correlation is significant at the 0.05 level (2-tailed).

The results in Table (1) indicate that the correlation between the items and the total score was weak, while the correlation between the items and subscales was high which indicates high construct validity. The correlation ranged between (.303 - .725) for the fine motor sub-scale, (.218 - .545) for the self help sub-scale, (.202 - .726) for the receptive language sub-scale, (.384 - .624) for the expressive language sub-scale, (.254 - .729) for the gross motor sub-scale, (.236 - .623) for the social emotional sub-scale, and (.367 - .789) for the academic sub-scale. Thus, internal consistency is achieved for the scale in its whole form, except for four items which need to be replaced due to weak correlation. The scale has the required psychometric properties. For instance, in the area of validity, it was noticed that the significance of correlated validity for the domains of the scale were as follows: cognitive (0.79), physical (0.83), social (0.82), and total score for the scale (0.84).

The indicators of reliability were extracted in two ways: the scale's test-retest reliability, and the internal consistency reliability. The values of the coefficients of reliability for the test-retest ranged between (0.88-0.92) for the different domains, and (0.91) for the total mark. The coefficients of reliability for internal consistency using Cronbach's Alpha had values between (0.82-0.91) for the different domains, and (0.89) for the total mark on the scale. In addition, results of the Pearson Correlation between the two scales based on data gathered from a sample of 39 children was (.964), which indicates high concrete validity for the translated version of the PEDS:DM.

### Reliability Indicators

After testing the validity of the instrument, its reliability coefficient was checked through two steps:

- Internal consistency: This was measured according to Cronbach's Alpha, with a reliability coefficient of (.867), which indicates high reliability.
- Test-retest reliability: Using the scale twice in two weeks for 30 parents to measure the stability of characteristics, the results were (.946\*\*), indicating high reliability.

### Discussion

This pilot study aimed to evaluate the relevance, validity and reliability of the Jordanian version of the Parents Evaluation of Developmental Status: Developmental Milestones (PEDS:DM) for Jordanian children. Regarding reliability coefficients of the PEDS:DM, the study put forward several methods of evaluating reliability in data collection, as the reliability of the Jordanian version was checked using internal consistency and test-

retest reliability.

The study results indicated that the reliability coefficients were very high in all the methods used to check it, which is due to the accurate translation procedures, the clarity of the application instructions, and the level of global reliability the PEDS:DM incorporates. Moreover, several validity coefficients were evident in the Jordanian version of the PEDS:DM. The preliminary indicators for the validity were expressed through face validity, construct validity and concurrent validity. The Jordanian version of the PEDS:DM proved to have a strong correlation with a previously validated developmental measure, which further proved its validity. Finally, the correlation coefficient between the sub-scales forming the PEDS:DM, and the total score of the scale was high.

These results indicated concordance with the psycho-metry of the original PEDS:DM Manual, which showed a similar ability to reliably measure all items on the same scale consistently, and to produce stable test scores when administering the assessment on several occasions (Glascoe & Robertshaw, 2008). Moreover, these results support the findings of previous studies administered on the PEDS:DM including studies by Bedford, Walton and Ahn (2013) and Halle et al. (2011), which found the PEDS to compare well when reviewed next to other developmental assessments and measures.

### Conclusions

The purpose of this study was to obtain and provide an Arabic Jordanian version of the PEDS:DM that is culturally aligned with the Jordanian context and psychometrically valid and reliable. The validity of this Arabic version scale was checked by measuring the face validity and the construct validity. In addition, concurrent validity was measured by calculating the Pearson Correlation between the Arabic version of the PEDS:DM and the Preschool and Kindergarten Children's Performance scale (PKCPS), which was established and developed by Al-Batch (2001). The results indicate high concrete validity for the translated version of the PEDS:DM.

After testing the validity of the instrument, its reliability coefficient was checked through internal consistency and test-retest reliability. The findings indicate high reliability of the scale. Consequently, the Arabic Jordanian version of the PEDS:DM is psychometrically valid and reliable for the implementation in the Jordanian context. As a result, this instrument is recommended to be utilized by a variety of stakeholders who are interested in early intervention of children in the Jordanian early childhood settings. It can be useful for Arabic contexts that are similar to Jordanian context.

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