THESIS

VALIDITY OF THE AMPS FOR CHILDREN AND ADOLESCENTS

Submitted by

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WE HEREBY RECOMMEND THAT THE THESIS PREPARED UNDER OUR SUPERVISION BY TODD LARS POULSON ENTITLED THE VALIDITY OF THE AMPS FOR CHILDREN AND ADOLESCENTS BE ACCEPTED AS FULFILLING IN PART REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE.

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ABSTRACT OF THESIS

VALIDITY OF THE AMPS FOR CHILDREN AND ADOLESCENTS

A vast number of assessments are available for occupational therapists to measure the functional independence of their clients, however, the majority were developed primarily for use with adults and older persons. A scarcity exists of reliable and valid functional assessments of personal activities of daily living (PADL) and instrumental activities of daily living (IADL) for testing children and adolescents. As a result, PADL or IADL assessments designed for use with adults have been applied to the pediatric population, often without being reevaluated for validity or reliability.

Unlike most existing tests of PADL or IADL, the Assessment of Motor and Process Skills (AMPS) is unique in that it was designed to be used with school-age children, adolescents, adults, and older persons. The AMPS is a standardized IADL assessment tool used to evaluate a person's functional performance in terms of both motor IADL and process IADL ability.

The AMPS was used to evaluate a sample of 162 school-age children and adolescents who had no known diagnosis. Subject goodness-of-fit statistics, generated by the many-faceted Rasch analysis, were examined to determine whether children and adolescents fit the many-faceted Rasch measurement model defined by the AMPS adult calibration sample.

Overall findings suggest that school-age children and adolescents demonstrated subject goodness-of-fit to the AMPS process scale, but failed to demonstrate acceptable subject goodness-of-fit to the AMPS motor scale. These findings were supplemented with an analysis of the proportion of individual item ratings that were unexpected or misfit. On both scales, the proportion met our criterion, which was based on a previous analysis of adult well and older well subjects.

In addition, we divided the sample into two groups based on age. The comparison of the two groups revealed that for the AMPS motor scale, 88% of misfitting subjects were 8 years of age or younger. This suggests that subjects 8 years of age or younger were more likely to misfit than were subjects 9 years of age or older.

Of the 16 AMPS motor skill items only one item, Lifts, was significantly different for children and adolescents than for the AMPS adult calibration sample. However, no meaningful difference was found in young children's subject ability measure, regardless whether the item Lifts was included in the analysis.

The results of this study support the use of the AMPS with school-age children and adolescents, although it is important for occupational therapists to be aware that young children may tend to misfit on the AMPS motor scale. In addition, recognizing the lack of valid and reliable assessments of IADL available for children and adolescents, the AMPS meets the need for a standardized evaluation for this population.

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Todd Lars Poulson

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INTRODUCTION

A vast number of assessments are available to occupational therapists for assessing the functional status or level of independence of their clients (Asher, 1989; Branch & Meyers, 1987; Kane & Kane, 1981; Gain, Hertfelder, & Schafer, 1988). The majority of assessments, however, were developed primarily for use with adults and older persons (Crooks, Waller, Smith, & Hahn, 1991; Guralnik, Branch, Cummings, & Curb, 1989).

In contrast, there is a scarcity of reliable and valid functional assessments of personal activities of daily living (PADL) or instrumental activities of daily living (IADL) that are available for testing children and adolescents (Gowland et al., 1991.). A few PADL tests have been developed for children, including the Pediatric Evaluation of Disability Inventory (PEDI) (Haley, Faas, Coster, Webster, & Gans, 1989), the Klein-Bell Activities of Daily Living Scale for Children (Klein & Bell, 1982; Law & Usher, 1988), and the Functional Independence Measure for Children (WeeFIM) (Granger, Hamilton, & Kayton, 1989). Although there is evidence that they have adequate reliability and validity, they were designed only to test children less than 7 or 8 years of age (Gowland et al., 1991). There are no tests of IADL for children.

As a result, PADL or IADL assessments designed for use with adults have been applied to the pediatric population, often without being reevaluated for validity or reliability (Gowland et al., 1991; Law & Usher, 1988). "Although many of the conceptual approaches that have been applied to adult functional assessments are also relevant for

children, they need to be expanded and elaborated to fit within a developmental and ecologic framework" (Haley, Coster, & Ludlow, 1991, p. 696). When including children and adolescents with the adults in the standardization samples of functional outcome measures, the developmental patterns and timetable for acquiring competencies must be taken into account (Haley et al., 1991). Some functional skills may not yet be perfected or they may just be emerging. The standard at which a child is assessed must be typical of what is seen at that age, and the process a child undergoes in accomplishing the task must be evaluated against the manner typical for that age (Christiansen, Schwartz, & Barnes, 1988; Lehr, 1990). Unfortunately, the focus of describing the development of children has been on the emergence and elaboration of components skills such as language, memory, ambulation, or grasp patterns rather than on the process of acquiring competencies in PADL or IADL (Haley et al., 1991).

Unlike most existing tests of PADL or IADL, the Assessment of Motor and Process Skills (AMPS) (Fisher, 1995a) was designed to be used with school-age children, adolescents, adults, and older persons. The AMPS is a standardized IADL assessment tool used by occupational therapists to evaluate a person's functional performance in terms of both motor IADL and process IADL ability. Although the AMPS was not designed to evaluate underlying impairments, the occupational therapist can use the AMPS to evaluate, at the level of disability, those IADL motor or process skills that directly support or limit the quality, effectiveness, or efficiency of performance of IADL tasks.

Based on the assumption that the component motor and process actions of performance evaluated through the use of the AMPS (Table 1) are similar for persons of any age, the AMPS was designed to evaluate the functional performance abilities of persons 5 years of age and above (Fisher, 1995a). We do not assert that all persons have equal IADL ability or style of performance. We do, however, assert that motor or process skills that are easier for one group (e.g., children) also are more likely to be easier for other groups (e.g., adults, older adults) (Fisher 1993, 1995). Moreover, we expect that the quality, effectiveness, or efficiency of the component motor and process actions in children increase with age, just as they decrease in older adults or any persons with disabilities (Fisher & Dickerson, 1993). Our assumption that AMPS IADL motor and process ability increases with age in young children has been supported by Bächstrom (1995), who evaluated children, ages 6, 9, and 12 years of age. She found that the mean AMPS motor and process ability of her sample subgroups increased significantly with age. These findings suggest the feasibility of using the AMPS in observing the functional performance of children and adolescents.

While concern may be expressed regarding the appropriateness of an IADL assessment for children, many of the IADL tasks included in the AMPS manual are as simple as making a bed or getting a drink from the refrigerator. Our experience with the AMPS has revealed that even young children are familiar with and engage in many of the IADL activities included in the AMPS manual.

When considering the appropriateness of the use of the AMPS with children, it is helpful to be aware that during an AMPS task observation, the individual is expected and encouraged to perform the task in his or her usual manner. It is essential when assessing children and adolescents for the examiner, therefore, to be familiar with how children and adolescents perform tasks, and allow the person to perform the task in his or her own way. For example, when making a sandwich, a younger child may need to retrieve the plate from a high cupboard shelf. We have observed that children may do this by one of several ways. Some children pull a chair near the counter and climb up on it in order to reach the plate. Others climb up on the adjoining counter and retrieve the plate while kneeling or standing on the counter. Unless there is an observable risk of danger (e.g., falling, dropping the plate) or standing on the counter is viewed as unhygienic, the child would not be scored down for climbing onto the counter. Instead, the child would be scored based on how effective or efficient were his or her component motor and process actions. Scoring also allows for consideration of the cultural values of the child's family as a basis for determining if climbing on the counter was acceptable.

At other times, we have observed children to perform tasks in a manner that we have judged to be inappropriate. For example, we observed a young child to make one side of her bed and then jump up and walk across the top of the bed to get to the other side. Because walking across the bed caused the sheets and blanket to become disarrayed, we viewed her actions as ineffective or inefficient.

Through the use of the many-faceted Rasch analysis (Linacre, 1993), the hierarchical comparison of the abilities of different persons who performed different tasks becomes possible by accounting for or considering the challenge of the tasks, the difficulty of each motor or process skill, the scoring severity of the rater, and the ability of the individual (Fisher, 1993, 1995). The Rasch model also has been used to determine the stability of the hierarchical order of item difficulty across relevant groups (Duran & Fisher, in press; Magalhães, Fisher, Bernspång, & Linacre, 1996; Wright & Masters, 1982; Wright & Stone, 1979), and to examine the goodness-of-fit of items or persons to the measurement model (Fisher, 1995a).

While the AMPS was designed to be used with children and adolescents, the AMPS has been standardized on adults. This situation has occurred because more than 97% of the subjects in the AMPS data base, the source of the sample used to standardize the AMPS, are 16 years of age or older. There is need, therefore, to evaluate the validity of the use of the AMPS with children and adolescent.

One source of evidence to support the use of the AMPS with children and adolescents can be obtained by evaluating whether children and adolescents fit the existing many-faceted Rasch model (Linacre, 1993) that has been defined by the adult standardization sample (i.e., a model defined by the task challenge, item difficulty, rater severity, and rating scale step calibrations derived from preset [anchored] values for the AMPS computer scoring program that was based on the adult standardization sample) (Fisher, 1995a). When a specified subgroup is examined for inclusion in a larger sample,

the fit of the subgroup is evaluated relative to the model defined by the original sample (Linacre, 1993; Wright & Masters, 1982). That is, goodness-of-fit statistics are generated to evaluate whether or not the person response patterns of the new sample are as expected based on the pre-existing model.

In order for a subgroup to show acceptable goodness-of-fit to the many-faceted Rasch model that defines the AMPS, the members of the group must meet the following assertions: (a) easier items must be more likely to be easier for everyone and harder items must be more likely to be harder for everyone, (b) easier tasks must be more likely to be easier for everyone and harder tasks must be more likely to be harder for everyone, and (c) strict raters must be more likely to be consistently be strict and lenient raters must be more likely to be consistently be lenient (Fisher, 1993, 1995). This means that tasks and items that are more likely to be easier (or harder) for the standardized sample must also more likely be easier (or harder) for children and adolescents and strict (or lenient) raters must reliably be strict (or lenient) when rating either adults or children.

If children and adolescents demonstrate patterns of response across the AMPS items and tasks that are consistent with the assertions of the many-faceted Rasch model that defines the AMPS, they can be said to demonstrate person response validity (Wright and Masters, 1982). However, if tasks or items that are relatively easier for adults are relatively harder for children and adolescents, or if tasks or items that are relatively harder for adults are relatively easier for children and adolescents, then the children and

The purpose of this investigation was to examine the validity of the Assessment of Motor and Process Skills (AMPS) when used to evaluate school-age children and adolescents. This study addressed the question: Do children and adolescents fit the many-faceted Rasch measurement model defined by the AMPS adult calibration sample?

METHODS

Subjects

The sample for this study came from all existing subjects in the AMPS database at Colorado State University in Fort Collins, Colorado who had no known diagnosis and were between 3 and 15 years of age (n=162). Prior to initiating this study, 6% of eligible subjects were omitted due to obvious AMPS rater scoring error. There was essentially an equal ratio of male to female subjects in the sample. The majority of subjects were of white/European ethnicity, making up 95% of the sample population. Demographic characteristics of the samples are shown in Table 2. Subjects in the database were assessed using the AMPS by trained and calibrated raters from North America, the United Kingdom, Scandinavia, New Zealand, and Australia.

Instrumentation and Procedure

The AMPS was administered by occupational therapists according to standardized procedures described in the AMPS manual (Fisher, 1995a). All therapists had (a) participated in a 5-day course where they were trained in the administration and interpretation of the AMPS, and (b) fulfilled the requirements to become calibrated as a reliable AMPS rater.

The AMPS observation begins with an interview where the examiner inquires about the person's interests and experience with IADL task performance. The

occupational therapist then narrows down the list from the 56 IADL tasks found in the AMPS manual to a subset of five or six IADL tasks that would be challenging and relevant to the person being evaluated. Possible task choices may include washing dishes, vacuuming, making a sandwich, or preparing french toast and a beverage. The person then chooses two or three IADL tasks to perform from the five or six options offered by the examiner.

The AMPS is unique in that it allows the person to be assessed while performing IADL tasks with which he or she is familiar, chooses to perform, and has experience performing. Children as well as adults are able to select tasks that they know how to do and that are relevant.

Through collaboration with the client, the constraints of the tasks to be performed are established and the environment is set up in a manner that ensures familiarity (Fisher, 1995a). The necessary conditions of the task are reviewed by the examiner prior to the person initiating the task performance to ensure that the person understands the task criteria. The examiner then observes the person's performance and when the person is done, scores and interprets the results.

The AMPS allows occupational therapists to simultaneously evaluate an individual's motor and process skills in the context of IADL activities. For each task, the person is rated on the 16 motor and 20 process skill items shown in Table 1. Each skill item is scored using a 4-point rating scale to indicate the extent to which the person experienced increased difficulty, decreased efficiency, or decreased quality skill item

performance. A score of 4 indicates competent performance, a score of 3 indicates questionable performance, a score of 2 indicates ineffective performance, and a score of 1 indicates deficit in performance (with an unacceptable outcome being observed) (Fisher, 1995a).

Motor skills pertain to how the person moves him- or herself or the task objects during the performance of the task. For example, the examiner observes how the person positions him- or herself in relation to objects, lifts, manipulates, and moves items, and endures for the duration of the task performance. Process skills include those skills needed to organize and adapt actions as the task performance unfolds over time in order to effectively complete a task. For example, the examiner observes how well the person heeds the essential goal, logically sequences steps, restores tools and materials, and accommodates or modifies his or her actions if experiencing difficulty with the task.

The raw data from the scored motor and process skill items (skill item ratings) are transformed by the AMPS computer-scoring program, through a many-faceted Rasch analysis, into linear ability measures. These measures represent the person's position on the AMPS motor and process scales, adjusted to account for the challenge of the tasks observed and the severity of the rater.

As evaluated by goodness-of-fit statistics for calibrated raters (Linacre & Wright, 1994; Wright & Stone, 1979), the AMPS has high inter- and intrarater reliability with 95% of the raters having acceptable fit to the measurement model (Fisher, 1995a). Research has shown the AMPS to be valid cross-culturally (Dickerson & Fisher, 1995; Clawson,

1995; Goldman & Fisher, in press; Goto, Mayberry, & Fisher, in press; Magalhães, Fisher, Bernspång, & Linacre, 1996), and across age groups (Dickerson & Fisher, 1993). Other investigations have demonstrated the AMPS to be valid across diagnostic categories (Bernspång & Fisher, 1995; Girard, 1995), and to be without bias between men and women (Duran & Fisher, in press).

RESULTS

To test the hypothesis that children and adolescents fit the many-faceted Rasch model (Linacre, 1993) defined by the AMPS adult calibration sample, the data were evaluated through examination of subject goodness-of-fit mean square (MnSq) infit and outfit residuals and their associated *t* statistics (Fisher, 1993; Linacre, 1993). The FACETS (Linacre, 1993), many-faceted Rasch analysis computer program was used to generate these statistics.

The subject MnSq residuals, which are the differences between observed and expected scores, and the standardized score residuals *t*, provide evaluations of the degree to which subjects fit the measurement model. MnSq fit statistics > 1.4 alerts us that a person of lower ability obtained unexpectedly high scores on hard items or that a person of higher ability obtained unexpectedly low scores on easy items (Fisher, 1995a; Wright & Masters, 1982; Wright & Stone, 1979). When MnSq values > 1.4 are associated with values of $t \geq 2$ the extent of deviation may be considered significant (Fisher, 1995a). Our criterion for an acceptable overall rate of subject goodness-of-fit to the AMPS many-faceted Rasch measurement model was 95% or more of the subjects (Fisher, 1995a).

On the AMPS process scale, 95% of children and adolescents demonstrated acceptable goodness-of-fit to the AMPS adult calibration sample. Since only 8 of the subjects (5%) misfit, we concluded that children and adolescents demonstrated acceptable

goodness-of-fit to the many-faceted Rasch measurement model for the AMPS process scale. On the AMPS motor scale, 16 of the subjects (10%) failed to meet acceptable goodness-of-fit to the measurement model that defines the AMPS motor scale. We concluded, therefore, that children and adolescents exceeded our criterion for goodness-of-fit on the AMPS motor scale.

We then supplemented our evaluation of subject fit with a second method for evaluating goodness-of-fit — overall percentage of misfitting ratings (Fisher, 1995a, Goto, Mayberry, & Fisher, in press). A previous analysis of the data for 609 adults (16 to 59 years of age) and 488 well older adults (60 years of age and above) revealed an overall rate of misfitting ratings ($t \geq 3$) on the AMPS motor and process scales of 2.0 to 2.5% (Fisher, 1995b). Based on the rationale that children and adolescents should be expected to meet similar standards of fit as do adults and older persons, we set our criteria for an acceptable rate of misfitting ratings as $\leq 2.5\%$.

For our sample, the total number of AMPS motor skill item ratings was 5877. Of these ratings 132 (2.2%) were unexpectedly high or low ($t \geq 3$) and were, therefore, judged as misfitting ratings. The total number of AMPS process skill item ratings was 7385. Of these ratings, 116 (1.6%) were unexpectedly high or low ($t \geq 3$), and again judged as misfitting ratings. While the number of children and adolescents who failed to demonstrate acceptable goodness-of-fit on the AMPS motor scale exceeded our criterion, we concluded that the overall proportion of misfitting for both AMPS scales was acceptable.

DISCUSSION

The purpose of this study was to investigate the validity of the Assessment of Motor and Process Skills (AMPS) when used to evaluate school-age children and adolescents. Subjects' goodness-of-fit statistics were examined to determine whether children and adolescents fit the many-faceted Rasch measurement model defined by the AMPS adult calibration sample. We expected 95% or more of the sample to fit. Our results suggested that children and adolescents demonstrated goodness-of-fit on the AMPS process scale, but failed to demonstrate acceptable subject goodness-of fit on the AMPS motor scale. We supplemented this with an analysis of the proportion of individual item ratings that were unexpected or misfit. On both scales the proportion was < 2.5% and met our criterion that we set based on a previous analysis of adult well and older well subjects (Fisher, 1995b). To further understand why children and adolescents failed to demonstrate acceptable subject goodness-of-fit to the many-faceted Rasch measurement model on the AMPS motor scale, we examined those subjects and items that misfit.

We divided the sample into two age groups. Group one consisted of subjects 3 to 8 years of age (n=66), and group two consisted of subjects 9 to 15 years of age (n=96). The comparison of the two groups revealed that for the AMPS motor scale, 88% of the misfitting subjects were 8 years of age or younger. Complete results are shown in Table 3. This suggests that while a relatively high proportion of the overall sample failed to

demonstrate acceptable goodness-of-fit to the AMPS adult calibration sample on the AMPS motor scale, subjects 8 years of age or younger were more likely to misfit than were subjects 9 years of age or older. Those subjects 9 years of age or older met our criteria for 95% acceptable goodness-of-fit to the many-faceted Rasch measurement model that defines the AMPS adult calibration sample.

In addition, we examined the AMPS motor skill items to determine where the misfitting ratings were most likely to occur. Of the misfitting items, 23% of misfitting scores were associated with the skill item Lifts. Children tended to get lower than expected scores. The other two motor skill items with a higher than expected proportion of misfitting ratings were Calibrates and Moves, associated with 19% and 7% of the misfitting rating, respectively.

Since children and adolescents most often scored unexpectedly low on the skill item Lifts, we reanalyzed the data, eliminating this item from our analysis. With the AMPS motor skill item Lifts removed, children and adolescents demonstrated 95% goodness-of-fit to the measurement model. To determine the actual effect that retaining Lifts had on the goodness-of-fit of the sample, we compared the subject ability measures from the original analysis to that of the reanalyzed data for those subjects 8 years of age or younger to determine the amount of change in subject ability measures. We observed that children and adolescents experienced an average change in subject ability of 0.12 logits. Overall change in ability measures for 94% of the sample was $\leq$ 0.2 logits on the AMPS motor scale. Although children and adolescents tended to misfit more frequently when

Lifts was included in the analysis, the many-faceted Rasch measurement model based on the AMPS adult calibration sample and including Lifts can be used to obtain a relatively accurate estimate of subject ability. Thus, while raters who use the AMPS computer-scoring program may observe a higher percentage of misfit for children, the calculated subject ability measures appear to be valid.

We also considered performing a similar series of analyses to evaluate the effect of removing both Lifts and Calibrates, the two most misfitting items. When we attempted to do so, we encountered another potential source of error. Many of the subjects now had maximum scores. Closer examination of the data revealed that some of the tasks selected for the children or adolescents to perform may have been too easy. One of the biggest sources of error in the AMPS occurs when a person performs tasks that are too easy and does not offer an appropriate challenge (Fisher, 1995a). This results in inflated ability measures due to error associated with off-target assessment. One possibility is that raters assume children are not able to perform harder tasks.

Summary and Recommendations

The AMPS was found to be valid when assessing children and adolescents on the AMPS process scale, but young children (i.e., under the age of 9) demonstrated an increased likelihood of misfitting on the AMPS motor scale. When the AMPS motor skill item Lifts was eliminated from the analysis, children and adolescents demonstrated acceptable goodness-of-fit on the AMPS motor scale. However, there was no meaningful difference found in subject ability measures regardless whether or not the motor skill item

Lifts was included in the analysis. Therefore, we concluded that the estimation of performance ability of children was not being adversely affected by retention of the AMPS motor skill item Lifts. While the results of this study support the use of the AMPS with children and adolescent, it is important for occupational therapists to be aware that young children may tend to misfit more frequently on the AMPS motor scale. Further, it is necessary for those evaluating children and adolescents to recognize that children and adolescents need to be offered appropriately challenging tasks.

We recommend that occupational therapists continue to use the AMPS with children and adolescents. Recognizing the lack of valid and reliable current assessments of IADL available for children and adolescents, the AMPS meets the need for a standardized evaluation for this population.

Although the results of this study supported the use of the AMPS with children and adolescents, further research is encouraged. First, we recommend expanding this investigation by including those children and adolescents who have an identified disability. Second, the AMPS has recently been expanded to include several PADL tasks, three of which are specifically developed for use with children. As more data on PADL tasks become available, it is recommended that the data for children and adolescents be analyzed to specifically observe if on the AMPS motor scale, young children demonstrate acceptable goodness-of-fit to the AMPS measurement model.

EXTENDED LITERATURE REVIEW

General Assessment: Purpose and Types

Assessments are assumed to be an initial determination of an individual's status and need for services for which treatment plans are based and monitored (Keith, 1984). Accurate assessments are the cornerstone of rehabilitation (Isaacs, 1992). Assessments can be carried out by various methods: (a) formal examination — testing what patients can do, (b) observation — seeing what they can do, and (c) self-reporting — estimating what they think they can do (Barer, 1993). Each method renders different results. Formal examinations may be the most "scientific", but are often difficult to standardize (Jones, 1991), and self-reports are easy, but frequently unreliable (Skurla, Rogers, & Sunderland, 1988). It is direct observation that provides more accurate and reliable information and gives a true indication of progress (Barer, 1993; Guralnik et al., 1989)

Performance Evaluation

Dunn (1993) suggested that it is essential for assessments conducted by occupational therapists to begin at the level of identifying what the person needs or wants to do. Incorporating the person's motivational system increases the opportunity of facilitating a successful outcome. "There are few, if any, components of a human performance that are not directly influenced by a person's level of motivation"

(Christiansen & Baum, 1991). Motivation is determined by a person's values and refers to the determination or persistence in pursuing a goal.

The occupational therapy assessment would include observation of performance within the appropriate context and identifying the components that promote, or hinder, the performance of tasks. "We need to embrace the approaches of promotion, prevention, intervention, and compensation", setting the tone for what is acceptable to assess (Dunn, 1993, p. 357). The focus should be on the individual's ability to perform roles, tasks, and activities in their desired, natural context. The evaluation tool selected must fit the nature of the information needed (Fisher & Short-DeGraff, 1993), as well take into consideration the volitional characteristics of our clients (Fisher, 1992a).

Occupational therapists need to consider the possibility that more complex and contextual tasks are more informative and relevant, providing better cues of functional performance, than do simple, contrived isolated tasks. Real life tasks give cues and reinforcers for ongoing performance that contrived or simulated tasks fail to provide (Dunn, 1993). An instrument that measures functional performance has clear validity for the task that it actually assesses, an aspect which can be compromised in self-report instruments (Guralnik et al., 1989).

Limitations of Performance Evaluations

In spite of the advantages, there are problems with some of the assessments of function that are currently used. For example: 1) Performance tests may identify limitations, but frequently fail to give specific information on whether the limitations have

any relevance to the actual activities or needs of the individual (Guralnik et al., 1989). While some assessments may be helpful in identifying individuals who are in need of therapeutic services, they tell us little about specific areas to target for intervention. Although they may identify what the individual can and cannot do, they do not always tell us why or why not or whether the individual wants or needs to do the task (Fisher, 1992b). 2) Assessments should be able to identify the effectiveness of the intervention as well as determine when intervention should be terminated (Fisher & DeGraff, 1993). Assessment measures should be descriptive of the person's current level of function, predictive of an outcome, and evaluative of a person's status over time to monitor any change in function (Law & Letts, 1989). 3) Few assessments used to evaluate functional performance are standardized and many are simply homemade checklists (Gowland et al., 1991; Law, 1993). Historically, functional assessments were often developed at one hospital to fit an operational need and then exported. The majority of these individual facilities have not had the resources or incentives to conduct validity and reliability studies (Johnston & Keith, 1993). Law and Letts (1989) found that several tests are merely composed of items selected from already existing evaluations, being slightly adjusted to meet a particular need, with limited evidence of reliability and validity.

In addition, direct observation may be time consuming and costly, and with the emphasis on cost containment, observation of ADL activities are often limited to simple tasks, reducing the feasibility of assessments using IADL tasks (Harris et al., 1986). Some

critics of functional assessments consider the time and cost involved to support the use of self-assessments (Meyers et al., 1993).

Currently, there is an abundance of assessments available in rehabilitative medicine. A recent Medline search on "assessments", "elderly", and "rehabilitation" revealed 20 to 30 new articles a month (Barer, 1993). Many clinicians produce their own "in-house assessment" or simply adapt a standardized assessment to fit the needs of their facility. This method of each facility having their own "home grown assessment package" produce therapeutic progress that is negligible due to the lack of standardization (Barer, 1993). Often, assessments fail to even have an adequate manual to ensure that the results are comparable across administrators of the scale (Johnston & Keith, 1993).

Need for Standardized Tools

Keith (1984), suggested that the lack of standardization is perhaps the greatest deficiency in the medical rehabilitation measurement. An assessment instrument that has standardized measures can be generalized from one patient to another and from one facility to another. Developers and users of evaluations must be familiar with the general principles of validity and reliability. Developers have the responsibility of constructing instruments that are standardized. The users must be able to select adequate instruments and know how to use them in the manner for which they were designed (Johnston & Keith, 1993). Improved standardized assessment tools will make treatment interventions more effective and provide more reliable means of disability evaluation, payment, program evaluation, and quality improvement procedures. The use of fewer, better standardized

assessments will enhance communication between professionals and other disciplines. "Deficiencies in measurement impede both research and practice in rehabilitation" (Johnston & Keith, 1993 p. 425).

Personal Activities of Daily Living

Among functional performance measures, personal activities of daily living (PADL) (e.g., bathing, dressing, grooming) assessments are the most numerous (Christiansen & Baum, 1991). Feinstein et al. (1986) found at least 43 different PADL instruments that have been developed over the past 40 years. PADL evaluations consist of an array of self- or proxy-reports of functioning, caregiver or family observations, and professional evaluations (Katz, Downs, Cash, et al., 1970; Kuriansky, Gurland, & Fleiss, 1976; Seeman et al., 1994). Yet, literature on self-report measures provide evidence that there are significant differences in PADL scores reported by the person when compared to those provided by family members (Guralnik et al., 1989) or proxy examiners (Edwards, 1990; Rubenstein, Schairer, Wieland, & Kane, 1984). Currently, there is no "gold standard" existing among PADL assessments (Law, 1993), and often, a composite of assessments are needed for an effective evaluative outcome (Reuben, Valle, Hays, & Siu, 1995).

Another problem with the use of PADL-based assessments is the possibility of a ceiling effect. PADL tests may be less effective in predicting the ability of a person to live in the community since some PADL tasks are often over-learned. For example, persons with cognitive decline, such as dementia, may retain many simple ADL abilities (e.g.,

eating, hand washing) despite overall functional decline and loss of more complicated domestic or instrumental activities of daily living (IADL) abilities. Moreover, PADL tests are of limited usefulness for comparing the functional performance of well persons, as most well adolescents, adults, and older persons can perform all PADL tasks independently. Also, clients who have physical impairments may often find PADL tasks like dressing and bathing more difficult than some more simple IADL tasks (Fisher, 1995).

Instrumental Activities of Daily Living

Although the more complex IADL tasks, such as household chores and meal preparation, are a part of most individuals' daily routines to care for themselves and can assess higher levels of performance (Avlund et al., 1993), a scarcity of IADL assessments exist (Law, 1993). Lawton (1987) stated that IADLs are more predictive of an individual's level of function. Additionally, because they vary in difficulty, IADL assessments can be used to evaluate a person access a broad spectrum of ability (Fisher, 1995). However, information does not exist for IADL assessments when the range of comparison is expanded to include children and adolescents.

Child and Adolescent Assessments

There are few functional evaluations available for assessing children (Gowland et al., 1991), and most often are designed to test children under 7 or 8 years of age. They also can be limited in their ability to provide an independent breakdown that is sensitive enough for children with severe physical or cognitive delays (Haley et al., 1991).

Often PADL or IADL assessments designed for use with adults are applied to a pediatric population without being re-evaluated for validity or reliability. "Although many of the conceptual approaches that have been applied to adult functional assessments are also relevant for children, they need to be expanded and elaborated to fit within a developmental and ecologic framework" (Haley, Coster, & Ludlow, 1991, p. 696). When including children and adolescents with the adult population in functional outcome measures, the developmental patterns and timetable for acquiring competencies must be taken into account. The standard at which a child is assessed must be typical of what is seen at that age, and the process a child undergoes in accomplishing the task must be evaluated against the method typical for that age (Christiansen, Schwartz, & Barnes, 1988; Lehr, 1990).

Moreover, there is an insufficient number of appropriate evaluations suitable for use with adolescents. The Vineland Adaptive Behavior Scales (Vineland) (Sparrow, Balla, & Cicchetti, 1984) covers the age range from birth to 18 years and includes four domains, Communication, Daily Living Skills, Socialization, and Motor Skills (suitable only for children under 6), as well as a summary score. Evaluations should be administered by professionals with graduate degrees and experience in the assessment of individuals and the interpretation of tests. Specific disciplines identified as most appropriate for administration of the Vineland are psychology and social work (King-Thomas & Hacker, 1987). The Vineland relies upon interview with the child or parent/caretaker to rate the child's performance. This could produce unreliable

information if the child does not accurately rate his/her own performance or if a parent/caretaker's bias exists (Gowland et al., 1991).

The Scales of Independent Behavior (SIB) (Bruininks, Woodcock, Weatherman, & Hill, 1984) are applicable for infant to adult age groups, but is most effective for ages 6 through adolescence. It is individually administered by interview and is used to assess skills needed to function independently in home, social, and community settings (Haley et al., 1991). The SIB consists of 14 subscales that are organized into four adaptive behavior skill clusters: Motor Skills, Social Interaction and Communication, Personal Living Skills, and Community Living Skills. The SIB also contains a scale of eight problem behavior areas that are organized into three maladaptive behaviors clusters: Internalized, Asocial, and Externalized. The SIB is able to be used as a short screening test, cluster of skills, or as a complete scale (Bruininks et al., 1984). Both the SIB and Vineland look at adaptive behavior in addition to ADL tasks, but limitations exist because they are primarily for use with persons experiencing developmental disabilities.

The Pediatric Evaluation of Disability Inventory (PEDI) (Haley, Faas, Coster, Webster, & Gans, 1989) considers the modifications used by the child, the physical assistance from others required for the child to complete the task, as well as the independence of the child. This allows for consideration of the context in which activities of daily living occur. (Gowland et al., 1991). The three content domains are self care, mobility, and social function. The PEDI is a judgement based assessment that can be administered by rehabilitation professionals through observation, parent report, or

structured interview. Due to the self-reporting format and limited therapist training, it is difficult for clinicians to assure that assessment procedures and scoring are completed accurately and consistently.

The Klein-Bell Activities of Daily Living Scale (Klein & Bell, 1982), designed for use with adults, has recently been modified for children and adolescents (Law & Usher, 1988). The assessment measures PADL skills, with each PADL skill being broken down into several small steps. Although Law and Usher found the Klein-Bell to be reliable with children from 13 months to 6 years, its usefulness has not been evaluated with older children or adolescents. The literature does not refer to any child or adolescent IADL assessment.

Assessment of Motor and Process Skills

The Assessment of Motor and Process Skills (AMPS) (Fisher, 1995) is a standardized IADL assessment tool used by occupational therapists to evaluate a person's functional performance in both motor and process skill ability. The AMPS was developed by occupational therapists to be "occupational-therapy-specific." The use of the AMPS is not to evaluate the impairments, but actually to aid the examiner in evaluating the quality of the component motor and process skill actions the person uses when engaging in IADL tasks.

The AMPS has been designed to be used with school-age children, adolescents, adults, and older persons (Fisher, 1995). Although it is has been difficult to identify differences in functional ability between adults and older persons or changes due to disease

or disuse (Spirduso & MacRae, 1990), the AMPS has been shown to be sensitive to distinguish differences (Dickerson & Fisher, 1993; Robinson & Fisher, 1996). It was found that older persons demonstrated age-related decline in functional performance of both a motor and process nature. In addition, Bächstrom (1995) evaluated children ages 6, 9, and 12 years of age using the AMPS and found that 6-year-olds had a significantly lower mean AMPS motor ability than did 9- or 12-year-olds, and that 12-year-old children had significantly higher mean AMPS process ability than the 9- or 6-year-old children.

The AMPS has the advantage of overcoming many of the limitations of existing tests. The AMPS is a standardized assessment administered by an occupational therapist who has been trained and calibrated in the use of the AMPS. The person's values, interests, and habits are considered in the evaluation, and the assessment is based on the evaluator's direct observation of the person performing familiar IADL tasks. This eliminates the inaccurate information gained through self- or proxy reports.

The AMPS provides 56 IADL task options consisting of familiar tasks that might be a part of a person's regular routine. The AMPS standardized IADL tasks vary from as simple as making a bed or getting a drink from the refrigerator to more complex tasks such as preparing eggs, meat, and coffee or cooking french toast.

The AMPS is unique in that it allows the person to be assessed while participating in IADL tasks with which he or she is familiar. The tasks are challenging and relevant to the needs of each individual. Thus a 6-year-old being evaluated would be able to select a task that he or she knows how to do and the same would be true for other persons along

the age range. The AMPS is the only evaluation tool available to occupational therapists that evaluates performance skills that are impacting directly on the performance of the IADL task. The AMPS provides the need for a powerful and sensitive tool that can assist occupational therapists with planning and documenting change.

It is possible to observe and evaluate all 16 motor and 20 process skills during each of the 56 tasks that are available. Motor skills pertains to how the person moves him- or herself or the task objects during the performance of the task. Domains of motor skills include posture, mobility, coordination, strength and effort, and energy. Examples of motor skills the examiner observes include how the person *Positions* him- or herself in relation to objects, *Lifts*, *Manipulates*, and *Moves* items, and *Endures* for the duration of the task performance. Process skill domains are energy, using knowledge, temporal organization, space and objects, and adaptation. How the person *Attends* to the task, *Heeds* the essential goal, *Sequences* steps in a logical order, *Restores* tools and materials, and *Accommodates* actions are examples of process skill items that would be observed as the person performs IADL tasks.

Research has shown the AMPS to be valid cross-culturally and across age groups (Dickerson & Fisher, 1993; Fisher, Liu, Velozo, & Pan, 1992; Magalhães, Fisher, Bernspång, & Linacre, 1994). Other investigations have demonstrated the use of the AMPS in both home and clinic settings (Nygård, Bernspång, Fisher, & Winblad, 1994; Park, Fisher, & Velozo, 1994), valid across diagnostic categories (Doble et al,. 1994; Pan & Fisher, 1994), and without bias between men and women (Duran & Fisher, in press).

There is only limited information, however with regard to the validity and reliability of the AMPS for use with children and adolescents.

Table 1

AMPS Motor and Process Skill Items

Motor Skills	Process Skills
Posture	Energy
Stabilizes	Paces
Aligns	Attends
Positions	
	Using Knowledge
Mobility	
	Chooses
Walks	Uses
Reaches	Handles
Bends	Heeds
	Inquires
Coordination	
	Temporal Organization
Coordinates	
Manipulates	Initiates
Flows	Continues
	Sequences
Strength and Effort	Terminates
Moves	Space and Objects
Transports	
Lifts	Gathers
Calibrates	Organizes
Grips	Restores
	Navigates
Energy	
	Adaptation
Endures	
Paces	Notices/Responds
	Accommodates
	Adjusts
	Benefits

Table 2

Subject Demographics of Age, Ethnicity, Gender, and Number of Tasks Performed

Age	
M	9.3
SD	3.0
Range	3 to 15
Ethnicity	
White/European	154
Black/African	5
Asian	1
Other	2
Gender	
Male	84
Female	78
Number of task(s) performed	
1	17
2	115
3	25
4 or more	4

Table 3

Subject Misfit by Age Group

		Subject Misfitting	
		Motor	Process
Age Group	*n*	*n*	*n*
3 to 8 years	66	14 (21%)	3 (5%)
9 to 15 years	96	2 (2%)	5 (5%)
Total Sample	162	16 (10%)	8 (5%)

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