Using the Assessment of Motor and Process Skills to Compare Occupational Performance Between Clinic and Home Settings

Steve Park, Anne G. Fisher, Craig A. Velozo

Key Words: activities of daily living evaluation • environment

Objectives. The study described in this article examined the effect of home versus clinic settings on the instrumental activities of daily living (IADL) performance of older adults.

Method. Twenty older adults living in the community were evaluated in their homes and in an occupational therapy clinic with the Assessment of Motor and Process Skills (AMPS). The motor and process ability measures were compared between the two settings using multi-faceted Rasch analysis.

Results. The subjects’ motor ability measures tended to remain stable from clinic to home settings. The process ability measures tended not to remain stable from clinic to home settings, because 10 of the 20 subjects performed significantly better in their homes.

Conclusion. These findings support the idea that process skill abilities are affected by the environment to a greater degree than are motor skill abilities and that for persons living in the community, the familiar home environment tends to support IADL performance. If an occupational therapist wants to know how a person performs IADLs, the therapist should evaluate that person’s performance in the environment in which the client will be functioning.

During rehabilitation intervention, occupational therapists frequently use performance assessments in a clinic setting to help make predictions regarding a client’s functional performance in his or her home environment (Haworth & Hollings, 1979; Keith, 1984). However, on the basis of the results of an activities of daily living (ADL) or instrumental activities of daily living (IADL) assessment conducted in a clinical environment (i.e., inpatient hospital, outpatient clinic, or skilled nursing facility), occupational therapists often draw conclusions regarding a client’s ability to live safely and independently at home.

Despite this common practice, both occupational therapists and their clients may question whether the client’s performance in the clinic is representative of his or her performance in the home. We have observed that rehabilitation clients frequently comment that their ability to perform ADLs or IADLs would be better if they were in their own homes. Many professionals have also asserted that performance in the home would be better than it is in the clinic. Familiarity with the home environment—the knowledge of one’s home surroundings and the routines used to complete tasks—may play a role in supporting performance (Howell, 1972; Kaplan & Kaplan, 1982; Nichols, 1976; Rowles, 1991). Yersa and Baum (1987) suggested that older persons living in institutional settings may be assessed as having lower functional levels than if assessed in more natural, familiar environments. Performing in a novel, unfamiliar environment may demand more ability than a person possesses, resulting in a
lower functional level of ADL or IADL performance. If this is the case, then the observation of a client's functional performance in an occupational therapy clinic would not be representative of the client's optimal performance.

**Literature Review**

Many professionals speculate that the specific setting in which a functional performance assessment is conducted can influence the results (Davidson, 1991; Eakin, 1989; Keith, 1984; Kelman & Willner, 1962; Nichols, 1976; Rowles, 1991; Spector, 1990; Willems & Halstead, 1978). Although there is widespread concern about the validity of generalizing assessment results from one setting to another, few research studies have compared the test results of the same persons from different settings (e.g., home vs. outpatient clinic) within a short period of time (Spector, 1990). Even with the studies that have been conducted, there are some concerns regarding the methodology employed. For example, in two studies involving persons who had had strokes, an observational assessment of ADLs and IADLs was used in the hospital, but a proxy-report or self-report assessment was used in the home (Andrews & Stewart, 1979; Nichols, 1976). The results of both studies revealed an overall lower ADL and IADL performance level in the home. However, considerable debate exists as to whether a person's verbal report of his or her ADL and IADL performance is equivalent to the results of an observational assessment of actual ADL and IADL performance (Branch & Meyers, 1987; Keith, 1984).

It seems likely that the use of two different versions of ADL and IADL assessments in the two settings confounds the results and undermines any conclusions one might draw regarding an overall lower functional performance level in the home. Studies that have compared the same persons tested in both clinic and home settings within a short period of time and that used the same observational performance assessment have revealed mixed results. In one study involving persons with rheumatoid arthritis, ADL and IADL tasks were assessed during an inpatient hospital stay and then again at home after discharge; significantly more deteriorations in performance were noted at home (Haworth & Hollings, 1979). In another study, persons who had had strokes were assessed twice in one week with an observational assessment of ADL and IADL tasks, once in the hospital and then again at home. The results indicated a slight tendency for the home scores to be lower than the hospital scores (Sheikh et al., 1979). Despite this trend indicating that functional performance level is lower in the home, one study suggested that no difference occurs. The same observational assessment of ADLs and IADLs was used in hospital and home settings to evaluate persons who had had strokes, and a comparison of the results between the two locales revealed no significant differences (Benjamin, 1976). The statistical analysis procedures, however, were not described. Finally, Nygard, Bernspang, Fisher, and Winblad (1994) used the Assessment of Motor and Process Skills (AMPS) (Fisher, 1994) to evaluate IADL task performance and tested 19 clients with suspected dementia in both a hospital clinic and their homes. Four clients demonstrated either significantly better IADL motor or process skill abilities when evaluated in the home, one client demonstrated significantly better IADL process skill ability in the clinic, and two clients had significantly better IADL motor skill ability in the clinic. The rest of the clients experienced no significant change in performance between the two settings. Finally, only one client's performance was significantly different between the two settings for both IADL motor and IADL process abilities. This finding suggests that clients' abilities may be affected differentially by a change in the assessment environment.

The results of the previous studies suggest varying conclusions regarding the effect of the environmental setting on functional performance. Further examination of the methodology employed in these studies may account somewhat for the different results obtained. Among those studies that employed the same performance assessment in both settings, three involved the use of a 3-point scale to rate the degree to which a person could independently perform each ADL or IADL task (i.e., requires maximal assistance, requires some assistance, independent) (Benjamin, 1976; Haworth & Hollings, 1979; Sheikh et al., 1979). The use of a narrow, 3-level rating scale to reflect a large range of ability (requires maximal assistance to independent) may contribute to a lack of sensitivity necessary to detect subtle changes in performance between settings (George & Fillenbaum, 1985).

In contrast to the global ADL and IADL indexes that are used to score level of independence on a number of ADL and IADL tasks, Nygard et al. (1994) used the AMPS to measure IADL task performance. The AMPS measures the direct effect of motor or process skill deficits on IADL task performance. The AMPS consists of 16 motor and 20 process skill abilities that are rated on a 4-point scale. In all, 36 discrete ratings of motor and process skills are made during observation of a single IADL task performance. Moreover, most subjects are observed and rated on their performances of two or three separate IADL tasks. Therefore, in the study by Nygard et al. (1994), most clients received ratings on 32 to 48 motor and 40 to 60 process skill items. This unique feature of the AMPS may have resulted in an increased sensitivity in that study to variations in performance due to setting.

Another methodological concern in examining the effect of setting on performance is the use of ordinal data for statistical analysis. The summing of qualitative ordinal counts to make quantitative comparisons of performance, even with the same person in different settings, is not a valid means of comparing performance (Merbitz,
Morris, & Grip, 1989; Silverstein, Kilgore, & Fisher, 1989). To make valid comparisons, the numbers used must be equal-interval (Wright & Linacre, 1989). Only Nygård et al. (1994) used equal-interval data for the statistical analysis. The summed AMPS scores for the motor and process skill items were converted through logistic transformation, using many-faceted Rasch analysis (Linacre, 1988, 1989), to linear ability measures (Fisher, 1993). Thus, a valid means of comparing performance across settings was possible.

In summary, although the results of some studies indicate that differences exist between ADL or IADL performances in different settings, the results are conflicting. Further, some studies contradict what professionals generally believe—that performance level would be lower in an unfamiliar environment than in a familiar one. There are concerns, however, regarding the methodology employed in the research studies, particularly with the sensitivity of the ADL and IADL assessment used and the reliance on ordinal data to compare scores obtained from two different settings. Additionally, the results of Nygård et al. (1994) suggested that clients may be differentially affected by the assessment setting. These considerations led us to use the AMPS to investigate further the effect of environmental setting on IADL task performance.

### The Assessment of Motor and Process Skills

Concerns regarding the potential effect of setting on functional performance were raised during the research development of the AMPS, an observational assessment that is used to assess simultaneously both the ability to perform IADLs and the underlying motor and process skill capacities necessary for task performance (Fisher, 1994). The AMPS is an assessment tool that requires a clinician to observe a person performing IADLs (e.g., meal preparation, home maintenance, laundry management) as he or she would normally perform them. The person chooses to perform two or three familiar tasks from among more than 50 possibilities described in the AMPS manual. After the observation, the clinician rates the person’s performance in two skill areas: IADL motor and IADL process (see Table 1). Motor skills are the observable operations or actions that are thought to be related to underlying postural control, mobility, coordination, and strength. The AMPS motor skill items represent an observable taxonomy of actions used to move the body and objects during actual performance. Process skills are the actions used to organize and adapt logically a series of actions over time in order to complete a specified task. Process skills are thought to be related to underlying attentional, conceptual, organizational, and adaptive capabilities of the person. Like the AMPS motor skill items, the AMPS process skill items represent a universal taxonomy of actions that can be observed during any task performance.

### Table 1

**AMPS Motor and Process Skill Items**

<table>
<thead>
<tr>
<th>Motor</th>
<th>Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stabilizes</td>
<td>Transports</td>
</tr>
<tr>
<td>Aligns</td>
<td>Lifts</td>
</tr>
<tr>
<td>Positions</td>
<td>Calibrates</td>
</tr>
<tr>
<td>Walks</td>
<td>Grip</td>
</tr>
<tr>
<td>Reaches</td>
<td>Endures</td>
</tr>
<tr>
<td>Bends</td>
<td>Paces</td>
</tr>
<tr>
<td>Coordinates</td>
<td></td>
</tr>
<tr>
<td>Manipulates</td>
<td></td>
</tr>
<tr>
<td>Flows</td>
<td></td>
</tr>
<tr>
<td>Moves</td>
<td></td>
</tr>
<tr>
<td>Stabilizes</td>
<td>Paces</td>
</tr>
<tr>
<td>Lifts</td>
<td>Infus</td>
</tr>
<tr>
<td>Transports</td>
<td>Heeds</td>
</tr>
<tr>
<td>Aligns</td>
<td>Inquires</td>
</tr>
<tr>
<td>Walks</td>
<td>Navigates</td>
</tr>
<tr>
<td>Reaches</td>
<td>Initiates</td>
</tr>
<tr>
<td>Bends</td>
<td>Continues</td>
</tr>
<tr>
<td>Coordinates</td>
<td></td>
</tr>
<tr>
<td>Manipulates</td>
<td></td>
</tr>
<tr>
<td>Flows</td>
<td></td>
</tr>
<tr>
<td>Moves</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** AMPS = Assessment of Motor and Process Skills.

During each IADL task performed for the assessment, and for each of the 16 motor and 20 process skill items, the person is rated on a 4-point scale: 1 = Deficit, 2 = Ineffective, 3 = Questionable, and 4 = Competent. Scoring criteria are detailed in the AMPS manual (Fisher, 1994). Because a clinician observes during the actual performance of IADL tasks which motor and process skills the person possesses that support his or her performance and which skills the person lacks that impede his or her performance, the clinician is able to measure directly why IADL task performance may be difficult for the person. Unlike existing ADL and IADL assessments, therefore, the AMPS can be used to clarify the relationship between specific skill deficits and global functional performance (Fisher, 1994).

Once the clinician has rated the IADL motor and process skill items, the raw ordinal scores are analyzed by the many-faceted Rasch computer program FACETS (Linacre, 1988). FACETS is the computer application of the many-faceted Rasch measurement model (Linacre, 1989), which is based on a mathematical model of the likelihood that a person will receive a given score on each of the motor and process skill items. The observed counts of the raw scores of IADL motor and process skill items constitute ordinal data. These counts are converted by logistic transformation into additive, linear measures. Once the raw scores are computer analyzed, the derived person ability measures (motor and process) are the estimations of the person’s position on the two AMPS scales (Wright & Masters, 1982). That is, the AMPS motor and process scales represent continua of increasing IADL motor or process skill ability, and the person’s estimated position on the AMPS motor and process scales, expressed in logits, represents his or her IADL motor and process skill ability (Fisher, 1993).

Many-faceted Rasch analysis is used because four facets are calibrated simultaneously on the same linear scale for both the AMPS motor and the AMPS process scales. The first three facets are: (a) skill item easiness, (b) task simplicity, and (c) rater leniency. To calibrate skill item easiness, FACETS follows a probability model based on the premise that some motor or process skill
items will be easier than others and some skill items will be harder. Moreover, the same skill items will be easier for all persons. Consequently, a person has a greater probability of obtaining a high score on an easy skill item than on a hard skill item (Fisher, 1993; Wright & Stone, 1979). Once calibrated, the item's estimated easiness is represented by its location on the linear scale.

To calibrate task simplicity, FACETS again follows a probability model. Each person evaluated will select tasks that vary in difficulty. Some tasks are more difficult than others. Moreover, just as with skill items, the same tasks will be easier for all persons. Hence, a person has a higher probability of obtaining a high overall score when performing simpler tasks than when performing more difficult tasks. Again, the degree of simplicity for each task is calibrated and located on the same linear process or motor scale as are skill item easiness calibrations.

Rater leniency is based on the assertion that raters are more likely to give high scores for the easier skill items than for the harder skill items. Moreover, lenient raters are more likely to give high scores to all persons on all skill items than are severe raters. Although raters will vary in their scoring leniency, the degree of leniency tends to remain stable within individual raters (Lunz & Stahl, 1990; Lunz, Wright, & Linacre, 1990). Through a process similar to traditional interrater reliability determination, each AMPS rater independently scores videotaped observations. Each rater's leniency can then be estimated and calibrated on the motor and process scales (Fisher, 1993).

Although the calibration of each of these facets has been presented as if each is calibrated separately, the FACETS computer program actually considers and calculates all facets simultaneously. Moreover, critical to the process is the fourth facet, person ability; the ultimate objective of the FACETS computer analysis. These ability measures (motor and process) are the estimated locations of a person of a given ability on the linear AMPS motor and process scales, as defined by the skill item easiness and task simplicity but adjusted for the individual rater who scored the task performance (Fisher, 1993, 1994). One of the advantages of using AMPS is that, because the person ability measures are adjusted for task simplicity, a clinician can predict whether a person possesses the motor or process ability to perform tasks that are more difficult than those the person was observed performing. An additional advantage is that, because there are more than 50 tasks to choose from in the assessment and each person performs two or three tasks, the number of versions of the AMPS that a person may take is almost endless. Yet, no matter what tasks the person performs, the person ability measures will be adjusted to account for the simplicity or difficulty of those particular tasks. Thus, direct comparisons can be made among persons even though they performed different tasks.

A series of studies conducted since 1985 with persons with psychiatric, orthopedic, neurological, cognitive, and developmental disabilities, as well as with older adults without disabilities living in the community, has resulted in the current version of the AMPS, and has confirmed the reliability and validity of the motor and process skill scales (Fisher, 1993, 1994; Fisher, Liu, Velozo, & Pan, 1992). As Keith (1984) stated, "Perhaps the single greatest deficiency in medical rehabilitation measurement is the lack of consideration given to the importance of standardization" (p. 76). Standardization is more than just establishing norms for populations; it is the development of a comprehensive test manual that delineates the assessment conditions, procedures to follow, qualifications for the examiner, and establishment of reliability and validity data. Given this premise, more studies are needed to understand fully the extent to which AMPS results can be generalized across medical conditions, settings, and cultures.

**Study Purpose**

In keeping with the need to investigate further the validity of the AMPS and to develop further standardization, the primary focus of this study was to determine whether IADL performance generalizes from clinic to home settings. Hence, the following research questions were posed:

1. Is there a significant difference in the mean AMPS IADL motor or process skill ability of a group of older persons living in the community between their homes and an unfamiliar clinic setting?
2. Are there persons who demonstrate significant differences in AMPS IADL motor or process skill performance between settings, and, if so, how many persons change, who are they, and in what setting are their performances better?

**Method**

**Subjects**

Twenty persons, over the age of 60 years and living in one of two retirement complexes in a small Oregon community, were volunteer subjects for this study. The mean age of this sample was 82.2 years (SD = 6.9) and their ages ranged from 62 to 90 years. Seventy-five percent of the subjects were women (n = 15) and 25% were men (n = 5). Although many of the subjects continued to perform their IADLs independently, the retirement complexes provided two meals a day and housekeeping services. The level of assistance required to live in the community ranged from moderate assistance to no assistance required. All subjects were ambulatory (with or without assistive devices) and demonstrated no evidence of great risk of injury in performing common household activities. Due to restricted access in the assessment clinic, persons...
with wheelchairs were excluded from this study. All subjects were free of any acute medical conditions (e.g., influenza, colds, headaches) that could have adversely affected their usual task performance. Subjects had various medical conditions, although two subjects declined to discuss their health status (see Table 2).

Instrumentation

The principal investigator (the first author) administered the AMPS to all subjects, following the assessment procedure as described in the AMPs manual (Fisher, 1994), but with one exception: potential tasks to perform for the assessment were restricted to 21 options. This restriction was necessary because when this study was initiated, some of the tasks contained in the AMPS manual were not yet adequately linked between subjects, tasks, and raters to ensure that the subject ability measures would be stable or valid. Other tasks were eliminated due to a lack of specific materials or adequate space in the assessment clinic.

Procedure

Before the initiation of the AMPS observation, all subjects were informed that the project was designed to study the effect of the environment on everyday task performance. In accordance with the standardized procedures described in the AMPS manual, each subject was interviewed to determine which of the 21 task choices might be relevant to his or her customary IADL performance.

During this process, the principal investigator attempted to narrow the options to five or six tasks that were most appropriate to challenge the subject's motor and process skill abilities. Then, each subject was asked to select two tasks (from among the five or six presented) that he or she would be willing to perform and was capable of performing both at home and at an occupational therapy clinic located within 1 mile of the subjects' homes.

To ensure familiarity with the home environment and the two chosen tasks, the principal investigator determined that (a) each subject had lived in his or her home for a minimum of 2 months, (b) each subject possessed all the tools and materials necessary for task performance in his or her home, and (c) each subject had performed the tasks a minimum of three times in the home within the previous 2 months. None of the subjects had been in the occupational therapy clinic before this study. All tools and materials were provided for use in the clinic and subjects were not allowed to use their own tools and materials in the clinic. Before performing the tasks in the clinic, each subject was allowed to explore the clinic physically and was encouraged to ask questions regarding the use of tools and materials in the clinic. In accordance with the AMPS manual, all subjects were asked to place the needed tools and materials in locations they felt were similar to their locations at home. This was done to ensure that each subject knew where to find the needed supplies and materials.

Each subject performed the two tasks twice: once in his or her own home and once in the assessment clinic. To minimize order effects, one half of the subjects first performed the tasks in their homes and the other half first performed the tasks in the clinic (see Table 3).

The interview and all tasks were performed consecutively within a time period averaging approximately 2 hr. To control for psychosocial influences during task performance, no other persons, except the principal investigator and an assistant, were present during the assessment. All subjects were videotaped during the performance of all tasks for later scoring by the principal investigator. Videotaping is not required for an AMPS evaluation, but was used in this study to allow for future scoring by the principal investigator or other raters.

Data Analysis

Steps to establish internal validity. Although the primary purpose of this study was to examine the effect of setting on functional ability, we had some concerns regarding potential risks to the internal validity of our design. To determine whether problems related to the research design were present, we took three steps. After analysis of the raw data, the first step involved verifying that all subjects and tasks demonstrated acceptable goodness-of-fit to the Rasch measurement model. Subjects with poor goodness-of-fit are ones whose response pat-
terms on the AMPS may be invalid. Tasks not demonstrating goodness-of-fit are ones that are not consistently easier or harder for all subjects performing them. The presence of either condition could compromise the results.

The second step to determine problems in research design involved verifying that the principal investigator reliably scored the subjects' performances. Acceptable goodness-of-fit of the rater is indicative of both interrater and intrarater reliability (Fisher, 1993).

Mean square goodness-of-fit statistics generated by FACETS were used to evaluate subject, task, and rater fit. The criterion for acceptable fit was set at mean square values greater than 0.6 or less than 1.4, when the mean square values were also associated with standardized fit statistics, $t < -2$ or $t > 2$. For further discussion of fit statistics, see Fisher (1993).

The third step was to ensure that there were no order effects. That is, although half the subjects were tested in the home first and the other half in the clinic first, the possibility of order effects remained. To test for this, two one-factor analyses of variance (ANOVAs), one for motor ability and one for process ability, were performed. The level of significance was set at $p \leq .05$.

Effect of Setting on Group Performance. To analyze whether an overall environmental effect occurred among the subjects, two paired two-tailed $t$-tests were performed to examine for a significant difference between mean home and clinic AMPS motor and process ability measures. The level of significance was set at $p \leq .05$.

Effect of Setting on Individual performances. To determine which subjects' motor or process ability measures differed between home and clinic, each subject's home and clinic ability measure, plus or minus the standard error, was graphically plotted. Traditional psychometric procedures calculate the standard error of measurement based on the variance of the average person sampled (Wright & Stone, 1979). An advantage of the FACETS computer program is that it reports the standard error of each person's ability measure (Linacre, 1989; Wright & Linacre, 1989). The estimated ability measure, plus or minus the standard error, delineates the range in which the person's true ability is most likely to fall. If the home and clinic ability measures, plus or minus the standard error, do not overlap, then a statistically significant difference in performances has occurred (Silverstein et al., 1989). Figure 1 illustrates this process for two hypothetical subjects, one whose performance differed significantly between settings and one whose performance did not differ significantly.

Results

Steps to Establish Internal Validity

The goodness-of-fit statistics for tasks and subjects reported by the many-faceted Rasch analysis indicated that all tasks and subjects demonstrated acceptable goodness-of-fit to the model. High rater reliability for the principal investigator also was indicated by the goodness-of-fit statistics (motor scale, $MnSq = 1.0, t = 0$; process scale, $MnSq = 1.0, t = 1$). Finally, the one-factor ANOVAs for both process and motor scales revealed that no order effect occurred (see Table 4). In other words, there was no significant difference in the mean ability measures for either motor or process skills between the subgroup of subjects who performed first in the home and the subgroup who performed first in the clinic.

Effect of Setting on Group Performance

Results of the two-tailed paired $t$-test for the motor scale

Table 3

<table>
<thead>
<tr>
<th>Subject</th>
<th>Task 1</th>
<th>Task 2</th>
<th>First Setting for Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Make a bed</td>
<td>Handwash dishes</td>
<td>Home</td>
</tr>
<tr>
<td>2</td>
<td>Handwash dishes</td>
<td>Make lunch meat sandwich</td>
<td>Clinic</td>
</tr>
<tr>
<td>3</td>
<td>Make toast and tea</td>
<td>Fold laundry</td>
<td>Home</td>
</tr>
<tr>
<td>4</td>
<td>Make grilled cheese and beverage</td>
<td>Repeat a plant</td>
<td>Clinic</td>
</tr>
<tr>
<td>5</td>
<td>Make fruit salad</td>
<td>Handwash dishes</td>
<td>Home</td>
</tr>
<tr>
<td>6</td>
<td>Sweep the floor</td>
<td>Make chicken salad sandwich</td>
<td>Clinic</td>
</tr>
<tr>
<td>7</td>
<td>Iron a shirt</td>
<td>Make eggs, toast, and beverage</td>
<td>Home</td>
</tr>
<tr>
<td>8</td>
<td>Make tuna salad sandwich</td>
<td>Iron a shirt</td>
<td>Clinic</td>
</tr>
<tr>
<td>9</td>
<td>Make tuna salad sandwich</td>
<td>Repeat a plant</td>
<td>Home</td>
</tr>
<tr>
<td>10</td>
<td>Make tuna salad sandwich</td>
<td>Make a bed</td>
<td>Clinic</td>
</tr>
<tr>
<td>11</td>
<td>Make a bed</td>
<td>Iron a shirt</td>
<td>Clinic</td>
</tr>
<tr>
<td>12</td>
<td>Make toast and instant coffee</td>
<td>Repeat a plant</td>
<td>Clinic</td>
</tr>
<tr>
<td>13</td>
<td>Make eggs, bacon, and brewed coffee</td>
<td>Iron a shirt</td>
<td>Home</td>
</tr>
<tr>
<td>14</td>
<td>Make eggs, bacon, and brewed coffee</td>
<td>Repeat a plant</td>
<td>Clinic</td>
</tr>
<tr>
<td>15</td>
<td>Make eggs, bacon, and brewed coffee</td>
<td>Handwash dishes</td>
<td>Home</td>
</tr>
<tr>
<td>16</td>
<td>Make eggs, bacon, and brewed coffee</td>
<td>Make a bed</td>
<td>Clinic</td>
</tr>
<tr>
<td>17</td>
<td>Make a bed</td>
<td>Fold laundry</td>
<td>Home</td>
</tr>
<tr>
<td>18</td>
<td>Iron a shirt</td>
<td>Make a bed</td>
<td>Clinic</td>
</tr>
<tr>
<td>19</td>
<td>Repeat a plant</td>
<td>Iron a shirt, no set-up</td>
<td>Home</td>
</tr>
<tr>
<td>20</td>
<td>Sweep the floor</td>
<td>Repeat a plant</td>
<td>Clinic</td>
</tr>
</tbody>
</table>

Note: AMPS = Assessment of Motor and Process Skills.

Table 4

<table>
<thead>
<tr>
<th>Location and Order of Assessment</th>
<th>$F$</th>
<th>$(df)$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor (home first versus clinic first)</td>
<td>1.16</td>
<td>(1,18)</td>
<td>.2968</td>
</tr>
<tr>
<td>Process (home first versus clinic first)</td>
<td>3.43</td>
<td>(1,18)</td>
<td>.0802</td>
</tr>
<tr>
<td>Motor (clinic first versus home first)</td>
<td>.60</td>
<td>(1,18)</td>
<td>.4730</td>
</tr>
<tr>
<td>Process (clinic first versus home first)</td>
<td>.12</td>
<td>(1,18)</td>
<td>.9114</td>
</tr>
</tbody>
</table>
indicated that there was no significant difference between the mean home and clinic motor ability measures. The two-tailed paired *t*-test for the process scale indicated that there was a significant difference for the group means between the two settings, with a lower performance level occurring in the clinic (see Table 5).

**Effect of Setting on Individual Performances**

Individual home and clinic ability measures with the accompanying individual standard errors were plotted graphically for both the AMPS motor and AMPS process scales. Examination of the home and clinic ability mea-

---

**Figure 1.** Graphic analysis of differences in person ability measures between settings for two hypothetical subjects. SEm = standard error of measurement.
For her, the familiarity of the home environment may have tended to support motor performance, as speculated by some professionals (Nichols, 1976; Rowses, 1991; Yerxa & Baum, 1987). This finding also concurs with Haworth and Hollings’ (1979) suggestion that clients who feel confident with their abilities in familiar environments may lose confidence in unfamiliar environments and thus experience increased difficulty performing ADL and IADL.

Subject 14 was the second subject whose motor performance was significantly better in the home; she also had the lowest AMPS motor ability measures in both settings. Her low ability measures reflected the effect of scoliosis on IADL motor skill and her need for moderate assistance to live in the community. She received lower scores on those AMPS motor skill items that are related to postural control and mobility. Further, her scores between home and clinic revealed that, in the clinic, she demonstrated a greater tendency to use external support when standing and walking. For this subject, as for Subject 18, the unfamiliarity of the clinic apparently affected the efficiency of her already poor motor skills.

Subject 17 was the third subject who experienced a significant improvement in AMPS motor ability in the home. However, the only observable differences between his performances in the two settings were that he lost his grip on the sheet while making the bed and lost his grip on a towel and sweatshirt while folding laundry when he performed these tasks in the clinic. Otherwise, his motor skill item raw scores were identical.

Discussion

Motor Ability Measures

The findings suggested that no overall significant difference occurred between the two settings for AMPS motor ability measures and that motor ability measures remained stable across home and clinic settings for the majority of subjects. That is, for the group overall, and for 16 of the 20 subjects, it did not make a difference whether the AMPS assessment was conducted in the clinic or at home. Interestingly, subjects with low AMPS IADL motor ability measures were just as likely to perform the same in either setting as were subjects with high AMPS IADL motor ability measures.

Four of the subjects, however, experienced a significant difference in motor performance and three of those performed better in the home than in the clinic. One of these, Subject 18, displayed better postural control and mobility skills in her home. Before the assessment, she stated that she used a cane when ambulating outside her apartment due to her fear of falling. Although she did not use a cane during either the home or clinic assessments, the lower scores awarded in the clinic for Stabilizes, Positions, Walks, Reaches, Moves, and Transports may have resulted from her lack of confidence in her postural control and mobility skills in the unfamiliar clinical setting. For her, the familiarity of the home environment may have tended to support motor performance, as speculated by some professionals (Nichols, 1976; Rowses, 1991; Yerxa & Baum, 1987). This finding also concurs with Haworth and Hollings’ (1979) suggestion that clients who feel confident with their abilities in familiar environments may lose confidence in unfamiliar environments and thus experience increased difficulty performing ADL and IADL.

Subject 14 was the second subject whose motor performance was significantly better in the home; she also had the lowest AMPS motor ability measures in both settings. Her low ability measures reflected the effect of scoliosis on IADL motor skill and her need for moderate assistance to live in the community. She received lower scores on those AMPS motor skill items that are related to postural control and mobility. Further, her scores between home and clinic revealed that, in the clinic, she demonstrated a greater tendency to use external support when standing and walking. For this subject, as for Subject 18, the unfamiliarity of the clinic apparently affected the efficiency of her already poor motor skills.

Subject 17 was the third subject who experienced a significant improvement in AMPS motor ability in the home. However, the only observable differences between his performances in the two settings were that he lost his grip on the sheet while making the bed and lost his grip on a towel and sweatshirt while folding laundry when he performed these tasks in the clinic. Otherwise, his motor skill item raw scores were identical.

In contrast to the previous three subjects, Subject 13 displayed a statistically significant decrease in motor performance in her home. However, the only observable difference between her performances in the two settings was that she dropped a roll of paper towels on the floor in her home during the task of making eggs, bacon, and brewed coffee.

Thus, for both subjects 17 and 13, relatively minor differences in task performance between the two settings accounted for statistically significant differences. Further, their AMPS motor ability measures (above 3.00 logits in both home and clinic settings) indicated a relatively high degree of IADL motor skill ability. Recent analysis of 434 physically fit, well persons who are able to live independently in the community revealed a mean AMPS IADL motor ability of 3.45 (SD = .79) (Fisher, 1994).

Our findings illuminate a potential limitation of the AMPS motor scale to measure subtle differences in IADL motor ability among physically fit, well persons located at the upper end of the AMPS IADL motor scale. Physically fit adults are expected occasionally to obtain scores of Questionable (score = 3), Ineffective (score = 2), or even Deficit (score = 1) on a few AMPS skill items, reflecting the normal performance variability that can occur among more skilled persons. For example, as with Subject 17, it is common for all persons to have objects slip from their hands occasionally. These small errors during different task performances among physically fit persons can result
in statistically significantly different AMPS IADL motor ability measures.

If one considers that the purpose of an occupational therapy assessment is to determine whether the person has sufficient motor skills to support occupational performance, this limitation in identifying differences in IADL motor ability among physically fit, well persons is not clinically meaningful. The AMPS motor (or process)
Figure 3. Comparison of subjects' clinic and home process ability measures.

ability measures should be interpreted in light of a person's position on the AMPS motor (or process) scale. If a person scores above 2.00 logits on the motor scale, this appears to indicate that he or she possesses sufficient motor skill ability to live independently in the community (Fisher, 1994; Nygard et al., 1994). Thus, even though statistically significant differences in performance may occur among persons, the difference may not be clinically
relevant, particularly if the AMPS ability measure indicates sufficient motor ability to support IADL performance. With this in mind, we can state that the results of this study indicate that if a person is evaluated with the AMPS motor scale in an occupational therapy clinic, a reasonably good prediction can be made regarding how that person will perform in his or her own home.

**Process Ability Measures**

Contrary to the results of the analysis for motor ability measures, a significant difference was found in process ability measures between the two settings for the group as a whole and for 10 of the 20 subjects. For these 10 subjects, performance in the home was consistently better than in the clinic. No clear pattern emerged to explain why certain subjects performed better in the home. One might speculate that those subjects who did not demonstrate a comparable performance between settings would be those subjects who possess lower process ability measures. It seemed logical to speculate that the lower the process skill ability that a person possesses, the more difficult it would be to adapt and perform well in an unfamiliar setting. This was not the case. Subjects with low process skill ability measures were just as likely as those with high process skill ability measures to differ in their performance between the two settings. Finally, examination of the level of assistance required to live in the community did not reveal which subjects would be more likely to demonstrate significant differences in performance between the two settings.

The AMPS IADL process skills scale has been shown to be a more sensitive measure of the ability to live independently in the community than has the AMPS IADL motor skills scale (Fisher, 1994; Nygård et al., 1994). Our results, therefore, underscore the importance of testing clients in the home if the purpose of the evaluation is to predict the ability to function in the home. In the absence of a home evaluation, a clinic evaluation may underestimate the person’s potential for occupational performance in his or her home.

Previous studies have noted that when a discrepancy in ADL or IADL performance occurred between settings, it was predominantly among those tasks that involved more interaction with equipment (e.g., making tea in a kitchen versus walking up stairs) (Haworth & Hollings, 1979; Sheikh et al., 1979). In other words, a difference in performance seemed more likely to result when the two settings were dissimilar (e.g., making tea in two different kitchens), than when the two settings were similar (e.g., walking up stairs, which are fairly standard across settings). Because AMPS IADL tasks require the use of tools and materials during task performance, the AMPS may be more sensitive to differences in performance between settings than are global ADL and IADL scales.

Further research designed to reveal why some people are better able to adapt to unfamiliar environments is indicated. One possible explanation is that conditions of stress are more likely to induce a decline in functional performance for some persons than for others. Some persons may demonstrate adequate performance at home under ideal conditions, but when they experience a stressful condition or event, their functional performance may decline. For this study, performing in an unfamiliar clinic may have been a stressful event that induced a decline in IADL process skill performance for some persons. Perhaps those persons whose process skill performance was lower in the clinic, if followed over time, would be those more likely to experience a decline in overall functional performance because they may be more susceptible to stressful conditions.

In an attempt to illuminate reasons why process skill performance level in the clinic was significantly lower for half of the subjects, we compared the home and clinic task performances for only those subjects with significantly different process skill ability measures. For these subjects, their raw scores in the clinic on the process skill items Searches/Locates, Handles, Notices/Responds, Accommodates, and Benefits tended to be lower than raw scores in the home for the same skill items for the same tasks performed by the same subjects. Searches/Locates pertains to the ability to look for and locate tools and materials. Although all subjects were given an orientation to the clinic, it appeared that initiating a logical search process and locating tools and materials were more effective in the familiar home settings than in the clinic. Handles pertains to the ability to support, stabilize, and hold tools and materials in a safe and appropriate manner. Lower scores in the clinic may again reflect the subjects’ unfamiliarity with the setting and the tools and materials used. Difficulty with handling unfamiliar objects may arise due to difficulty adapting to changes in settings. Notices/Responds pertains to the ability to respond appropriately to environmental cues. Lower scores in the clinic may have resulted because as persons age, sensory processes deteriorate and sensory information is processed more slowly (Lawton & Nahemow, 1973; Windley & Scheidt, 1980). When sensory deterioration (e.g., reduced acuity, hearing loss, diminished tactile sense) occurs, the ability to detect cues and respond appropriately to environmental information may be diminished. This diminished capacity may also result from the increased stress of performing in an unfamiliar setting, which may create a condition in which inefficient and deficit IADL process skill performance is more apparent. That is, Notices/Responds is related to the ability to detect (Notices) environmental cues that signal the presence of a problem in task performance and then adapt performance (Responds) to deal effectively with the problem.

Lower scores in the clinic on Accommodates and Benefits also indicated that the lower level of perform-
ance in the clinic was associated with a decreased ability to adapt behavior to solve encountered problems. This finding again may reflect that an unfamiliar setting puts a greater demand (or stress) on the person to respond to problems that arise during the course of the task and to prevent problems from recurring during the task. In familiar environments, persons experience a sense of knowing what to expect and of being able to predict what might or should happen next. Persons who are familiar with an environment are expected to be more effective in that environment than persons who are there for the first time (Kaplan & Kaplan, 1982). Referring specifically to older adults, Howell (1972) asserted that it is familiarity that improves performance. Further, she speculated that older adults can handle considerable complexity in environments as long as they are familiar with the environments, but that poorer performance will occur in unfamiliar environments even though the environment may be less complex. In this study, it appears that although the home and clinic settings were similar (i.e., the subjects performed mostly in kitchens in both settings), the problems that arose during task performance in the clinic were primarily due to the subjects’ lack of ability to adapt to the unfamiliar clinic setting.

The most important implication of the findings is that for many of the subjects, IADL process ability in the clinic did not accurately reflect IADL process ability in their homes. Although some subjects performed equally well in both the clinic and home settings, other subjects’ performances differed significantly. In the latter case, it appears that performance in the clinic underestimated performance ability at home.

**Clinical Implications and Study Limitations**

This study provides evidence that the setting in which an assessment is conducted may affect the results for some persons. Motor ability measures generally tend to remain stable across home and clinic settings. If a client living in the community was assessed in an occupational therapy clinic, it is likely that his or her IADL motor performance would reflect his or her performance in the home. However, although this may be true for the majority of clients, there are still some clients whose performance may be influenced by the clinical setting. This influence is even more likely with the AMPS process ability measures. For clients living in the community who are assessed in an occupational therapy clinic, it is likely that IADL process ability performance will be the same or better in their own homes. If clinicians want to obtain the best estimate of a client’s potential for IADL performance and the extent to which IADL motor or process skills support or limit performance, it is best to test the client in a familiar setting. Further, if clinicians want to find out how the client will perform in a specific setting of interest, it is best to assess him or her in that setting. The findings of this study also support Willems and Halstead’s (1978) assertion that clinicians need to assess performance by specific settings because variations in settings produce variations in performance.

We are not proposing that all clients will be affected in the same manner. This study was conducted with older persons living in the community and the results cannot be generalized to other populations. Although our results generally concurred with those of Nygård et al. (1994), differences in the results between the two studies also occurred. Moreover, further investigations will be needed to answer questions regarding other populations. For example, do inpatient rehabilitation clients demonstrate the same patterns of response when they are assessed in the hospital clinic and when they are assessed in their homes after discharge? This study was not conducted with subjects who demonstrated a broad range of abilities for motor and process skills. Further studies will need to be conducted with persons who are functioning at a lower level than persons living in the community.

**Conclusion**

The purpose of this study was to use the Assessment of Motor and Process Skills to investigate the effect of home versus clinic settings on the IADL performance of persons living in the community. The results indicated that IADL motor ability measures tended to remain stable from clinic to home settings for the majority of subjects. Further, among the four subjects whose motor performances between the two settings were statistically different, only two subjects demonstrated clinically meaningful differences. Process ability measures for IADL performance tended not to remain stable from clinic to home settings; one half of the subjects demonstrated significantly better performances in their homes than in the occupational therapy clinic. The results of this study concur with the results of Nygård et al. (1994). That is, some persons’ motor and process skill abilities appear to be affected differentially by the environment in which they perform.

Lawton (1979) asserted that it is unlikely that all behaviors are equally susceptible to environmental influences and raised the question, “On what human functions does the environment have the greatest effect?” (p. xix). This study supports the idea that process skill abilities are affected by the environment to a greater degree than are motor skill abilities. More specifically, the abilities Searches/Locates, Notices, Handles, Accommodates, and Benefits appear to be affected more than other process skill items. For persons living in the community, the familiar home environment, as opposed to an unfamiliar clinic setting, tends to support IADL performance. It appears that if occupational therapists wish to know how a client will perform IADLs, the therapists should evaluate the client’s performance in the environment in which the client will be functioning.
Acknowledgments

We thank Kim Bryze, MS, OTR, Anita Bundy, ScD, OTR, FAOTA, Alyson Burns, PhD, Gary Kielhofner, PhD, OTR, FAOTA. Karen Lenox, and Molly McEwen, MHS, OTR, for their invaluable support towards the completion of this study. We also thank the American Occupational Therapy Foundation for funding this project through the graduate student research grant program. This study was completed in partial fulfillment of the requirements for the first author’s Master of Science degree from the College of Associated Health Professions, University of Illinois at Chicago.

References