

## ASSESSMENT OF ACTIVITIES OF DAILY LIVING IN THE ELDERLY

*A Study of a Population of 76-Year-Olds in Gothenburg, Sweden*

Ulla Sonn and Kerstin Hulter Åsberg

*Department of Rehabilitation Medicine and Department of Geriatric and Long-Term Care Medicine, Gothenburg University, Department of Internal Medicine, Enköping Hospital and Uppsala University, Sweden. From The Population Study and Intervention Program of the Elderly in Gothenburg, Sweden (Project leader: Alvar Svanborg)*

**ABSTRACT.** The cumulative structure of personal daily activities (Katz' Index of ADL) and four well-defined instrumental activities (cooking, transportation, shopping, and cleaning) have been studied in a population of 76-year-olds ( $N=659$ ) in Gothenburg, Sweden. Sixty-five percent of the population were independent, 22% were dependent in instrumental activities, and 13% were dependent in both instrumental and personal activities. No person was dependent in personal ADL and independent in instrumental ADL. The internal consistency and the coefficient of scalability were well above the acceptance level, which indicated an internal reliability and validity of the new scale. The frequency of personal and home-assistance care, type of accommodation, self-assessment of self-care and domestic activities were compared with the level of dependence in ADL and indicated external validity. This cumulative instrument of ADL can be used to describe and compare the level of disability in elderly populations and to define the need for personal assistance in home care among disabled persons.

*Key words:* activities of daily living, elderly, disability, population studies, scalability, rehabilitation medicine.

Studies in Gothenburg, Sweden, have shown that the health and vitality of average 70-year-olds has increased during the past fifteen years (21). On the other hand, the number of people aged 80 and over will continue to increase and the incidence of diseases and disabilities will remain high. These groups also need more extensive social services and health care for each passing year. The relation between physical disability and age is well known in this age range (11, 22). Disability is often measured in terms of dependence or independence in personal daily life activities (P-ADL), for example feeding, dressing and bathing. In general population studies of elderly, attention should be paid to activities more typically experi-

enced by old persons living in the community since that will be more relevant to a larger proportion of the elderly. Activities such as housekeeping, transportation, and shopping, have come to be termed "Instrumental Activities of Daily Living" (I-ADL) (12). Instrumental daily life activities have also been shown to be more useful as a means of detecting disability in a general population of elderly than personal ADL (7, 12).

However, the frequency of disability will also depend on how the separate daily life activities are defined. For example, Gosman-Hedström et al. (8) found that one third of a representative 70-year-old population were ADL-reduced, when asked if they had problems with their ADL, used technical aids or if they were dependent on personal help in any of the activities in P-ADL (bathing, dressing, going to the toilet, rising from chair/bed, and eating). If disability—in this study—had been defined only as dependence on personal help, the result would have been that only 4% of the population was disabled instead of one third of the population.

There is a cumulative scale of dependence in six items of personal ADL, exemplified in Katz' Index of ADL (13, 14). Lawton & Brody (15) developed a Guttman scale of I-ADL, and Katz et al. (20) showed that two instrumental activities, namely shopping and transportation, can be ordered together with personal activities in a cumulative scale. In an earlier study, we have found that there was a cumulative relationship between certain well-defined instrumental activities (10). This sample was however rather small and included both aged and disabled persons, many of whom lived in rural districts. They were selected consecutively from persons who consulted an occupational therapist.

The purpose of this article is to study the cumulative structure of dependence in personal and instru-

Table I. Number of persons distributed by type of accommodation and use of service

	Men N=300		Women N=359		Total N=659	
	n	(%)	n	(%)	n	(%)
Type of accommodation						
Own home	281	(94)	336	(94)	617	(94)
Service apartment/old peoples home	5	(2)	11	(3)	16	(2)
Nursing home/hospital	14	(5)	12	(3)	26	(4)
Use of services						
Social service	32	(11)	48	(13)	80	(12)
Handicap transportation service	70	(24)	106	(30)	176	(27)

mental ADL, and the reliability and validity of the ADL scale in a general population of elderly persons.

### SUBJECTS AND METHODS

This report is a part of a population study (InterVention study of Elderly in Gothenburg, IVEG) which started in 1981/1982, with the main emphasis on intervention in a large group of elderly persons. A random sample of 1245 70-year-old persons was selected in order to study to what extent dysfunctions of aging could be postponed or reduced by social, physiological and medical intervention and to improve the quality of life of the elderly (5). The sample was divided into three groups in which groups I and II were examined at 70, 73 and 76 years of age and group III only at 76 years of age. The non-response between 70 and 76 years of age in groups I and II was 17.5%. The non-response in group III at the examination of 76 years of age was 30.9%. The non-response rate was 23% at the initial examinations in groups I and II at age 70. A comparison between responders and non-responders showed no major differences between the groups (5). The survival rate between 70 and 76 years was 79.8%.

The probands were examined at the age of 76 in 1988/1989. In this study 659 persons participated, 300 men and 359 women. Most of the men, 70%, were living in their own homes together with a partner, but only 38% of the women. Table I shows the distribution of persons by sex, type of accommodation, and use of services. Only 6.4% of the population lived in some kind of sheltered accommodation and there was no difference between men and women. Neither was there any significant difference between men and women in their use of social services or transportation service for the disabled.

All subjects were interviewed, either in their own homes or in nursing homes/hospitals by three occupational therapists who used a structured formula about social conditions (marital status, housing conditions, use of different kinds of services) and about performance in activities of daily living. The occupational therapists observed and assessed whether the probands had performed the activities independently or not. 'Independently' means that no other person is involved in the activity. The inter-observer reliability was tested in the former study (10) and it was found to be satisfactory.

Katz' Index of ADL was used with the exception of the item of continence and was supplemented by four instrumental activities, namely, cooking, transportation, shopping, and cleaning. Katz' Index is summarized in ADL-grades from grade A, which means independent in all personal activities, to grade G, which means dependent in all of these activities. Persons who cannot be classified in grades A to G are classified as 'Others'. Table II gives the definitions of the four instrumental activities (I-ADL) together with the definitions of Katz' Index of ADL. 'Partly dependent' is used to make it easier to dichotomize the assessment into independent or dependent to obtain the most perfect cumulative scale. 'Partly dependent' in cleaning is assessed as independent, and 'partly dependent' in shopping, transportation, and cooking is assessed as dependent (10). 'Partly dependent' is assessed as dependent in toileting, transfer, and continence, and as independent in bathing, dressing, and feeding (14). People living together were assessed as independent if they performed the activity when alone and as dependent if another person was involved in the activity.

The cumulative characteristics or the internal reliability and validity of the scale of P-ADL and I-ADL, can be studied in several ways.

1. The proportion of persons who cannot be classified according to the cumulative ADL grades (Others) must not exceed 5% (14).

2. The coefficient of reproducibility can be measured by the scale analysis technique described by Guttman (9). It is a measure of both reliability, reproducibility and the internal validity of the scale (construct validity).

The coefficient of reproducibility

$$= 1 - \frac{\sum \text{of errors of scale}}{\text{Number of patients} \times \text{Number of items}}$$

3. The coefficient of reproducibility has been refined by Menzel, into a more sensitive coefficient of scalability (18).

Coefficient of scalability

$$= 1 - \frac{\sum \text{of errors of scale}}{\text{Maximum number of errors}}$$

For calculation of the maximum number of errors, see (4, 10, 18). A coefficient of reproducibility of 0.90 confirms the

existence of a valid cumulative and unidimensional Guttman scale. If there is a skewness of the distribution either of items or of individuals, Menzel suggested the coefficient of scalability, which ought to be 0.60 or higher to confirm a valid Guttman scale. This method has been described in detail earlier together with the results of inter-observer reliability tests (4, 10). The internal consistency of the extended ADL scale was studied by using the Kuder Richardson formula 20 (KR 20) for dichotomously scored items (19). Guidelines for reliability coefficients are for individuals at least 0.85 and for groups 0.65.

The external validity was studied in several ways. The distribution of persons by ADL categories and ADL grades was analysed to show the discriminative validity. The concurrent validity was assessed by comparisons between the actual level of dependence and the type of accommodation (own home vs. sheltered accommodation) and between the level of dependence and the use of personal care and home help (1–2 times per month, 1–3 times per week and daily assistance). In connection with the home visit, the probands received a self-assessment form, where the following questions were included: Comparing yourself with persons of your own age, what opinion do you have about your own situation concerning personal care (bathing/taking a shower, using the lavatory, dressing etc.), and domestic activities (shopping, washing, cleaning, cooking etc.)? When answering the self-assessment form, the subjects were able to select from the following alternative responses: good, rather good, not so good, and bad. For 54 and 59 persons, respectively, no self-assessment form was recorded about personal care and domestic activities. Comparisons were made between the extended ADL scale and the self-assessments of personal care and domestic activities.

Further, the extended ADL scale was compared with one of six dimensions in the WHO handicap classification system (ICIDH) (23), the dimension of physical independence, in order to confirm the convergent validity. This classification is based on the actual performance of the persons and not on their capability. Physical independence is classified in eight grades, ranging from grade

- 0 = fully independent,
- 1 = aided independence,
- 2 = adapted independence,
- 3 = situational dependence,
- 4 = long-interval (> 24h) dependence,
- 5 = short-interval (every 10h) dependence,
- 6 = critical-interval dependence,
- 7 = special care dependence, to grade
- 8 = intensive-care dependence.

The eight grades were divided into three groups (0–2, 3–4, and 5–8), when compared with the three categories of the extended ADL scale: independent, dependent in I-ADL, and dependent in I- and P-ADL. Eleven missing values were registered. The assessment according to the WHO classification was made by the same occupational therapists who had carried out the ADL assessments.

Fisher's exact test was used for testing differences between men and women and dependence in ADL, type of living, and use of services. Only two-tailed tests were used. Values of  $p < 0.05$  were considered statistically significant.

## RESULTS

In order to find the best scalability, the distribution of persons was arranged from the most independent to the most dependent ADL grade (Table III). It was found, in contrast to the former study (10), that cleaning could be ranked first before shopping, as 32% were dependent in cleaning and 24% in shopping. Sixty-eight errors of scale were found. Five of them concerned cleaning, 11 shopping, 19 transportation, 18 cooking, 12 bathing, and 2 dressing, while 1 error of scale concerned going to the toilet. The 68 errors of scale were distributed among 66 persons, which means that only two persons had two errors of scale each, and 593 persons had no errors of scale. Of the 68 errors, 53 concerned I-ADL. Of the 53 I-ADL errors, 24 were sex-linked, mostly men who did not cook. The rest of the errors concerning both P- and I-ADL were either random errors or related to specific diagnoses such as neurosis, recent surgery, or accidents.

The definitions of the nine grades of the new cumulative ADL scale are given in Table IV, and the grades can also be seen in Table III. The results are summarized in grades from 0, which means independent in all activities, to 9, which means dependent in all activities. When the item of continence is included in the ADL scale, the grades will be 0 to 10. Persons who cannot be classified according to the scale are called 'Others'. All deviations but 11 (1.7% "others") could be accepted as fitting into a perfect scale by the definition of the grades, which permitted one activity to be unnamed. The three observers assessed different numbers of persons (range 120–409). The assessments of each observer were distributed in all ADL grades.

The coefficients of reproducibility and of scalability were found to be 0.99 and 0.87, respectively. This result is above the lower acceptance limit and confirms the cumulative characteristics and the internal reliability and validity of the scale. The internal consistency measures the internal reliability of a scale based on its items. The coefficients were 0.84 for P-ADL, 0.89 for I-ADL, and 0.90 for the total extended ADL scale.

The discriminative validity of the ADL scale was improved by the inclusion of the instrumental activities (Tables III and V). Two thirds of the assessed persons were independent in both instrumental and personal ADL, 22% were dependent in I-ADL and independent in P-ADL. About 15% were dependent in both I-ADL and P-ADL. There was no statistically significant difference between men and women in this

Table II. *Definitions of four instrumental activities and six personal activities included in Katz' Index of ADL and of independent, partly dependent, and dependent*

<i>Shopping</i>	gets to the store, manages stairs or other obstacles, takes out groceries, pays for them and carries them home
Independent	performs the activity when necessary
Partly dependent	performs the activity but together with another person
Dependent	does not perform the activity or needs assistance with some part of the activity
<i>Cleaning</i>	performs housing-cleaning, vacuum-cleaning, washing floors
Independent	performs the activity when necessary
Partly dependent	gets assistance in taking the carpets outdoors or assistance very seldom
Dependent	does not perform the activity or gets assistance with some part of the activity regularly
<i>Transportation</i>	gets to the stop for public transportation, gets on and goes by bus, tram, or train
Independent	performs the activity when needed
Partly dependent	performs the activity but together with another person
Dependent	does not perform the activity
<i>Cooking</i>	gets to the kitchen, prepares the food, manages the stove
Independent	performs the activity when needed
Partly dependent	does not prepare dinner-food or only heating up prepared food
Dependent	does not perform the activity
<i>Bathing</i>	means sponge bath, tub bath, or shower
Independent	receives no assistance (gets in and out of tub by self if tub is usual means of bathing)
Partly dependent	receives assistance in bathing only one part of the body (such as back or a leg)
Dependent	receives assistance in bathing more than one part of the body (or does not bathe self)
<i>Dressing</i>	means getting all needed clothing from closets and drawers and getting dressed, includes using fasteners, and putting on a brace, if worn
Independent	gets clothes and gets completely dressed without assistance
Partly dependent	gets clothes and gets dressed without assistance except for help with tying shoes
Dependent	receives assistance in getting clothes or in getting dressed, or stays partly or incompletely undressed
<i>Toileting</i>	means going to the 'toilet room' for bowel and urine elimination, cleaning self after elimination, and arranging clothes
Independent	goes to the 'toilet room', cleans self and arranges clothes without assistance. (May use support object such as cane, walker, or wheelchair, and may manage a night bedpan or commode, emptying it in the morning)
Partly dependent	receives assistance in going to the 'toilet room' or in cleaning self or in arranging clothes after elimination, or in using the night bedpan or commode
Dependent	does not go to the 'toilet room' for elimination
<i>Transfer</i>	means moving in and out of bed and in and out of chair
Independent	moves in and out of bed and in and out of chair without assistance. (May use support object such as a cane or walker)
Partly dependent	moves in and out of bed or chair with assistance
Dependent	does not get out of bed
<i>Continence</i>	means the function of controlling elimination from the bladder and bowel
Independent	controls urination and bowel movement completely by self
Partly dependent	has occasional 'accidents'
Dependent	supervision helps keep urine or bowel control, or catheter is used, or is incontinent
<i>Feeding</i>	means the basic process of getting food from plate or equivalent into the mouth
Independent	feeds self without assistance
Partly dependent	feeds self except for getting assistance in cutting meat or buttering bread
Dependent	receives assistance in feeding or is fed partly or completely through tubes or with intravenous fluids

Partly dependent is assessed as dependent in cooking, shopping and transportation and as independent in cleaning. Partly dependent is assessed as dependent in toileting, transfer, and continence and as independent in bathing, dressing, and feeding.

Table III. Number of persons distributed by index grade. Errors of scale marked with circles (independent +, dependent -)

No. of persons N=659	grade <sup>a</sup>	Feed- ing	Trans- fer	Going to toilet	Dress- ing	Bath- ing	Cook- ing	Trans- porta- tion	Clean- ing	Shop- ping	Sum of modal cate- gory fre- quen- cies	Sum of modal sub- scores
426	0	+	+	+	+	+	+	+	+	+		3 834
7	1	+	+	+	+	+	⊖	+	+	+		56
5	1	+	+	+	+	+	+	⊖	+	+		40
8	1	+	+	+	+	+	+	+	⊖	+		64
44	1	+	+	+	+	+	+	+	+	-		352
1	2	+	+	+	+	⊖	+	+	+	-		7
10	2	+	+	+	+	+	⊖	+	+	-		70
3	2	+	+	+	+	+	+	⊖	+	-		21
20	2	+	+	+	+	+	+	+	-	-		140
2	3	+	+	+	+	⊖	+	+	-	-		12
18	3	+	+	+	+	+	+	-	-	-		108
3	x	+	+	+	+	+	+	-	-	⊕		21
1	4	+	+	+	⊖	+	+	-	-	-		5
9	4	+	+	+	+	⊖	+	-	-	-		45
7	3	+	+	+	+	+	-	⊕	-	-		42
17	4	+	+	+	+	+	-	-	-	-		85
1	5	+	+	+	⊖	+	-	-	-	-		5
2	x	+	+	+	+	+	-	-	⊕	⊕		14
1	x	+	+	+	+	+	-	-	⊕	-		6
18	5	+	+	+	+	-	-	-	-	-		90
2	x	+	+	+	+	-	-	⊕	-	-		10
20	6	+	+	+	-	-	-	-	-	-		120
2	x	+	+	+	-	-	-	⊕	-	-		10
1	x	+	+	+	-	-	-	⊕	-	-		5
4	7	+	+	-	-	-	-	-	-	-		28
1	7	+	-	⊕	-	-	-	-	-	-		7
20	8	+	-	-	-	-	-	-	-	-		160
6	9	-	-	-	-	-	-	-	-	-		54
Sum of modal category frequencies		653	632	629	603	573	541	529	499	451	5 110	5 411

<sup>a</sup> A non-scale type is designated x.

respect. But a study of the single items showed that significantly more men ( $p < 0.001$ ) were dependent only in cooking than women. Men had a tendency to be classified into the more dependent grades than women. No probands were dependent in P-ADL only, which means that there was a cumulative structure between instrumental items and personal items. Although there was a skew distribution of persons, with the majority being independent, the dependent persons were distributed in all grades.

The concurrent validity is shown in Tables VI and

VII. Of those who lived in their own homes, 69% were independent, 23% were dependent in I-ADL, and 8% were dependent in both I- and P-ADL. The corresponding results for those who lived in service apartments or in old peoples' homes were 12, 26 and 62%. All persons who lived in nursing homes or hospitals were dependent in I- and P-ADL. Thirty-one persons belonged to the most dependent ADL grades (Grades 7, 8, and 9), two thirds of them lived in some type of sheltered accommodation, and one third lived in their own homes. They received support from their

Table IV. Definitions of the personal and instrumental ADL grades according to a cumulative scale

Katz' ADL Grade	Grades I+P-ADL	Definitions
A	0	Independent in all activities
A or B	1	Dependent in one activity
A or B	2	Dependent in cleaning and one more activity
A or B	3	Dependent in cleaning, shopping and one more activity
A or B	4	Dependent in cleaning, shopping, transportation, and one more activity
B	5	Dependent in all I-ADL and one more activity
C	6	Dependent in I-ADL, bathing and one more activity
D	7	Dependent in I-ADL, bathing, dressing and one more activity
E	8	Dependent in I-ADL, bathing, dressing, going to the toilet and one more activity
F/G	9	Dependent in all activities
Others	Others	Dependent in two or more activities but not classifiable as above

If the item of continence is included, the definitions of the last two steps will be as follows:

F	9	Dependent in I-ADL, bathing, dressing, going to the toilet, transfer and one more activity
G	10	Dependent in all activities

relatives and assistance from the social service or service from hospital, such as day-care or similar facilities. Only 7% of the independent persons received some form of regular assistance compared with about 90% of the persons who were dependent in one or two activities and 100% of those who were dependent in three or more activities (Table VII). Twenty-seven percent of the study population used the Handicap Transportation Service. Of those, only 49% of the women and 24% of the men were dependent in transportation as defined in the extended ADL scale.

The concurrent validity is also shown by the relationship between the observers' ADL assessments and the probands' self-assessments of their personal care and domestic activities (Figs. 1 and 2). Eighty-one percent of those who noted bad or not so good about

how they managed P-ADL were also dependent in P-ADL, while 7% of those who noted good or rather good were dependent in P-ADL. Seventy-one percent were independent and felt good or rather good about how they managed personal care compared with others of the same age. Eighty-four percent of those who noted not so good or bad about how they managed domestic activities were dependent in I-ADL. Twenty-four percent were dependent in I-ADL and still felt that they managed the domestic activities well or rather well.

The extended ADL scale was also related to the WHO classification of physical independence, which is shown in Fig. 3. Ninety-four percent of those who were assessed as independent (class 0-2) in the WHO classification were also assessed as independent by

Table V. Distribution of male and female subjects categorized as independent and dependent in I-ADL and dependent in I- and P-ADL

ADL-category	Men		Women		Total		
	n	(%)	n	(%)	n	(%)	
Independent	190	(63)	236	(66)	426	(65)	NS
Dependent in I-ADL	62	(21)	83	(23)	145	(22)	NS
Dependent in I- and P-ADL	48	(16)	40	(11)	88	(13)	NS
Dependent only in P-ADL	0	(0)	0	(0)	0	(0)	
Total	300	(100)	359	(100)	659	(100)	

NS=no significance.

Table VI. Distribution of persons by type of accommodation and level of independence and dependence

ADL-category	Type of accommodation					
	Own home		Service apartment/ old peoples' home		Nursing home/ hospital	
	<i>n</i>	(%)	<i>n</i>	(%)	<i>n</i>	(%)
Independent	424	(69)	2	(12)	0	(0)
Dependent in I-ADL	141	(23)	4	(26)	0	(0)
Dependent in I and P-ADL	52	(8)	10	(62)	26	(100)
Total	617	(100)	16	(100)	26	(100)

the ADL scale, and all but 6% who were assessed as dependent in the WHO classification were assessed as dependent in the ADL scale. Those persons who were classified in classes 3-4 were generally situation-dependent. They were dependent in I-ADL and those who were dependent in P-ADL were dependent in bathing. Those persons who were classified in groups 5-8 were dependent more frequently and were dependent in more 'critical' situations in P-ADL, such as dressing, going to the toilet and transfer. Those who were dependent in I-ADL in this group were dependent in cooking.

## DISCUSSION

One important limitation of Katz' Index of ADL is that improvements in grade A and dependence in I-ADL cannot be detected. This is why a cumulative extension of this ADL scale is valuable. The former study of the cumulative structure of personal and

instrumental ADL (10) was carried out in a small population ( $n=85$ ) while this study concerns a general population ( $n=659$ ) of elderly people in Gothenburg.

The items chosen for this ADL scale are essential to most people and concern important activities of daily living. They are defined with the purpose of describing different levels of disability. Since the instrumental activities are more complex, they could be useful for detecting dysfunctions earlier than if only personal ADL are assessed.

The interview methodology may imply an over- or underestimate of the ADL capacity. Visiting subjects in their homes provides an opportunity to combine the interview with observations, and the persons who carried out the interviews in this study were occupational therapists who were trained to analyse disabilities in the elderly.

In this study, the item of continence was excluded to avoid too many systematical errors of scale. Incon-

Table VII. Distribution of persons per ADL grade by frequency of assistance in personal care and home help

ADL-grade	Frequency of assistance (percentage)								
	No assistance		1-2 times a month		1-3 times a week		Daily assistance		Total <i>n</i>
	<i>n</i>	(%)	<i>n</i>	(%)	<i>n</i>	(%)	<i>n</i>	(%)	
0	397	(97)	19	(43)	9	(9)	0	(0)	425
1	7	(2)	22	(50)	27	(27)	8	(7)	64
2	2	(0)	2	(5)	23	(23)	7	(7)	34
3	0	(0)	1	(2)	21	(21)	5	(5)	27
4	0	(0)	0	(0)	13	(13)	14	(13)	27
5-9	0	(0)	0	(0)	2	(2)	67	(63)	69
Others	2	(1)	0	(0)	4	(4)	5	(5)	11
Total	408	(100)	44	(100)	99	(99)	106	(100)	657

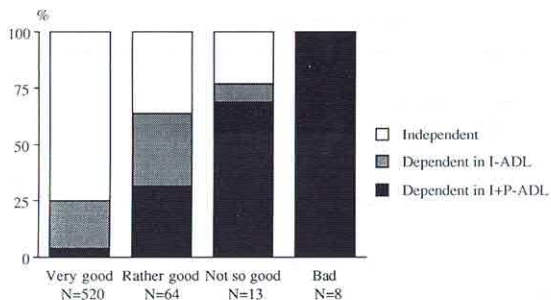


Fig. 1. Agreement between self-assessment in personal care and level of dependence in ADL. (Observe the different size of the groups.)

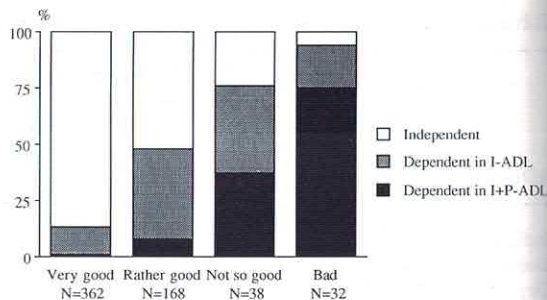


Fig. 2. Agreement between self-assessment in domestic activities and level of dependence in ADL. (Observe the different size of the groups.)

tinence is quite common among elderly women (17), and this item will not fit into a uni-dimensional activity scale. Continence is a physiological function rather than an activity, and according to the WHO criteria for Impairments, Disabilities and Handicaps, continence is classified as an impairment (23).

Most elderly people in general populations are expected to be independent in personal ADL. According to an assessment of the personal activities as in Katz' Index of ADL in this 76-year-old population, 87% were classified as independent compared with 65% when the instrumental activities were added. The subjects were distributed over all grades, and there was a cumulative structure between the instrumental and the personal categories, which confirms an improved discriminative validity of the extended ADL instrument.

Several studies have shown the prevalence of disability in I-ADL (1, 3, 6, 8, 11, 22). In all these studies the highest percentage of personal help concerned housework as is the case in this study, where cleaning was the most frequent need. People living together often perform the instrumental activities together, that is, that they are voluntarily dependent on each other. It is important that an ADL instrument should detect the change from voluntary to involuntary dependence.

There were only 15 errors of scale concerning P-ADL but 53 concerning I-ADL. Instrumental activities represent complex tasks made up of many components. They may be sex-linked and influenced by cultural and environmental factors to a higher degree than the personal activities. To minimize the number of systematic errors, further studies should be performed to improve the definitions of the items, to test

the instrument on persons with different diagnoses and in different age-groups.

The coefficients of reproducibility and scalability showed that the extended ADL scale had internal reliability and validity in a general elderly population when the item of continence was excluded.

The item 'washing', used in the former study (10) was excluded in the present study, as the definition of the activity was indistinct, and 'shopping' has been ranked second to 'cleaning' to fit into the cumulative scale. Environmental factors may affect the order of these items as the distance from the home to shopping centres will differ in rural and urban areas.

Forty-nine percent of the women who had Handicap Transportation Service (HTS) were independent respecting transportation in the ADL scale. For men the figure was 24%, which may partly be due to the higher incidence of mobility disorders for women (2). Explanations of the fact that independent persons are using the HTS could be difficulties in using public

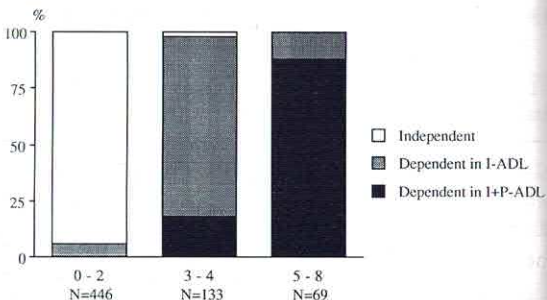


Fig. 3. Agreement between WHO's classification of independence and level of dependence in ADL. (Observe the different size of the groups.)



transportation or distance to the bus stop, etc. Other difficulties are getting on to the bus-tram-or-train and passing along in the bus when it is moving. Lundgren-Lindquist et al. (16) have shown that among 79-year olds 20% of the women and 6% of the men had difficulties in a test situation. The difficulties in the real-life situation may be assumed to be worse.

One third of those who were dependent in grades 7, 8, or 9, were living in their own homes. All of these needed assistance several times a day and also often at night as they were dependent in going to the toilet. This support was either given by the social services system or mostly by close relatives. The activity 'going to the toilet' should be seen as a 'critical item', for persons returning home after hospital treatment.

Seven percent of the persons classified as independent in the ADL scale, had personal help, which could be explained by the fact that these persons were dependent in areas not measured with this scale. Two percent were dependent in the ADL scale and had no assistance and these persons were dependent only in transportation.

The concurrent validity was also confirmed by the strong agreement between self-assessment of personal care, domestic activities and level of dependence in ADL. Very few were over-optimistic or underestimated their capacity.

The WHO classification is a taxonomy rather than an instrument for assessing the daily life activities, designed for a variety of applications. However, there is a correlation between independence and dependence in the extended ADL scale and the WHO classification of physical independence, which confirms the convergent validity to some extent. Further studies should be performed to compare the ADL scale with another valid and reliable ADL instrument to improve convergent validity.

This extended ADL scale is easy to administer because of its simplicity. The cumulative structure of instrumental and personal ADL provides information not only about a single item, but also about other items included in the scale. The activities included are well defined and cover central activities of the daily life, making it easier to discover disabilities in an elderly population at an early stage. The activities that can be assessed by means of this instrument are not only essential to people in general. Any restrictions of them due to impairment or disability will lead to loss of independence.

This study has shown that this cumulative ADL instrument is reliable and valid for assessing levels of

dependence both in personal and instrumental ADL in a general population of elderly persons. However, establishment of reliability and validity is always an ongoing process. The extended ADL scale provides information that is valuable in planning individual or group programs for elderly persons. It can also be used in research to describe and compare the level of disability in elderly populations, to evaluate the quality of life, and probably to predict the need for care among elderly and disabled persons in the future.

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*Address for offprints:*

Ulla Sonn  
Department of Geriatric and Long-Term Care Medicine  
Clinic IV, Vasa Hospital  
Aschebergsgatan 46  
S-411 33 Gothenburg  
Sweden