The Importance of the 4-Wheeled Walker for Elderly Women Living in their Home Environment

- a three-year study

THE SWEDISH HANDICAP INSTITUTE

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The Importance of the 4-Wheeled Walker for Elderly Women Living in their Home Environment - a three year study

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Abstract

Half of the women participating in this follow-up study, conducted three years after the original study, reported that their mobility had improved noticeably after using their walker for some time, this was despite a decline in their general state of health. The number of women who had had a fall since the initial interviews had not increased. Apart from the substantial public health cost savings that the use of the 4-wheeled walkers had achieved in terms of reduced home help and general support required the study subjects had remained active in their home environments thus accruing additional social benefits.

These findings endorsed those of the earlier study and confirmed the economic and social benefits achieved over time with consistent use of walkers even with individuals of advanced age and progressive physical decline.

Synopsis

This paper is based on three different-interview surveys carried out in 1998, 1999 and in 2001 with elderly women living in the Blekinge region who still live in their own home. The women were all over 75 years old and had already been given a 4-wheeled walker in 1998, the year of the first survey. 59 women took part in the first survey, 50 women took pat in the second survey and 30 women took part in the third survey. In the most recent survey the average age of the women was 87.

The purpose of this survey was to follow up and describe the living conditions for the women who used the 4-wheeled walking aid. The survey also investigates whether it is possible to discern evidence of financial and lifestyle benefits from using the 4-wheeled walking aid. The aim was also to study which changes that occurred over time and to try and show how these changes affect the need for the medical aid and other aid contributions.

The subjects experienced improved mobility after a period of training and of using the walking aid. The result is showing a significantly improved mobility although the subjective health had decreased and the health support had increased. As an explanation for the improved mobility, the women reported that they went out walking a lot and that they felt more confident with their walker. Half of the women had a normal gait pattern. A shift of body weight to one side was most common, with a limping gait which increased with age became more prominent. The women had poor balance that had worsened since the previous study. Some women had particular difficulty in rotating.

One third of the women had not had a fall since they were provided with their 4-wheeled walker. Less than half of the women had fallen one or more times since the initial study and, in the main, it was the same individuals that had fallen during the earlier reporting periods. Of the women who had fallen, none of them had been using their walker when the accident occurred. The individuals who fell were using sleeping tablets to a greater degree and had problems with dizziness. Almost half of the women reported problems

with urinary incontinence and four out of five women reported needing to visit the toilet during the night.

All of the study group women used their walker for outdoor activities. Half of the women used the walker indoors, a significant increase from the earlier studies. The women considered that considerable additional help and support would have been required if they had not had the use of their walker. The cost projection for such additional support during one year was calculated and compared with the cost of use of a prescribed walker for one year. The cost of one year's use of the walker was calculated to be SKr 840 per user. If the walker had not been supplied, the public health cost for the anticipated additional home support for the 3 years was calculated at SKr 8 770 kronor/year per woman. This figure is significantly higher than the calculated requirement in the initial study for individuals in the study group at that time and confirms that the economic significance of a walker-based programme increases progressively with ageing individuals.

I. Background

I.I Older peoples'functional ability

Increased knowledge of the importance of maintaining an active life has led to the older generation being motivated to remain active. Mobility is a deciding factor in this process and when reduced there are obvious risks associated with inactivity and the ensuing, rapidly reduced state of health. In the first instance, when mobility is reduced, the older person's ability to manage everyday situations is affected and he/she may increasingly become dependent on the resources of relatives or on the community services (Socialstyrelsen, 2001).

Preventive methods for older people are not only aimed at reduced illness and mortality, but at enabling the older person to function and retain well-being for as long as possible. Preventive interventions aim to minimise discomfort, reduce functional limitation and dependency as a consequence of illness (Dehlin, 2000). Despite the fact that many older people experience good health, many are struck by chronic illness and reduced functional ability. Women suffer to a greater extent from symptoms associated with mobility and therefore gait impairments.

The older person's rehabilitation possibilities today are reduced and not fully integrated in the 'care of the elderly in the community' programme. Aids to daily living are considered to be a part of the rehabilitation regime and a process free of assumptions is required before aids are prescribed. With an ageing population, the demands on, and requirements of, the public health system are increased and the prescription of aids to daily living is one component of an area where therapists and bureaucrats share responsibility (Socialstyrelsen, 2000). Aids to daily living form part of the care system with a view to retaining, improving, or replacing the older person's reduced functions.

1.2 Hip fractures, a public health problem

Hip fractures and falls of older women leading to hip fractures are a public health problem. The incidence of hip fractures has increased during the last decades and for women over 80 years the incidence has more than doubled. The average age of women that are afflicted by a hip fracture is 80 years. Hip fractures caused by falls are a common cause of illness and death. Research has established that about 20% of people experiencing hip fractures die within one year (Kannus et al., 1997, Cumming et al., 1997).

The two most important epidemiological factors implicated in hip fractures in the elderly are osteoporosis and falls. As Sweden has one of the world's oldest populations, hip fractures are a social and economic public health problem. The number of hip fractures in Sweden is estimated to be 18,000 per year, which amounts to a significant public health cost. Hip fractures occur twice as often among women as in men. As the number of older

people increases, the public health costs associated with hip fractures have become increasingly significant (Zethraeus and Gerdtham, 1998).

Accidents due to falls of the elderly cause severe personal suffering and often permanent impairments, together with reduced functions which often leads to an increased requirement for help to enable the older person to cope with daily living. When balance and gait problems have been diagnosed, falls can be reduced by increasing the use of the 4-wheeled walker. Such use can make a worthwhile contribution to reduced demand for specialised and costly care homes.

1.3 The 4-wheeled walker as a walking aid

The 4-wheeled walker has been proven to fill an important function in enabling people to move around independently despite severely diminished functional capabilities. When a 4-wheeled walker is used, the risk of fractures due to falls can be reduced despite a decline in general status of health (Jonsson, 1999). Physical activity is critical in the process of fracture prevention (Krolner et al., 1993, Johansson et al., 1993), and the fact that the older person can walk independently and move around outdoors contributes to strengthening muscles and skeleton, thus reducing fractures even though a fall may still occur.

300,000 people in Sweden use a 4-wheeled walker according to research conducted by the Hjalpmedelsinstitutet (2000). This level of usage is unique in the world and no other countries are using this form of aid to the same degree. A different attitude to disablement and reduced functional ability is quoted as an explanatory factor for this phenomenon. In Sweden, any stigma of using a 4-wheeled walker has been overcome and older persons show a positive attitude to aids that will improve the quality of daily living.

The Swedish health system provides the user with free aids which, of course, also affects the availability and uptake. Sweden experienced the onset of enhanced life expectancy earlier than many other countries with a consequent growth in the number of women suffering functional impairments. Sweden had an early increase in the proportion of elderly people and the number of women with walking problems. This has affected the developments of medical aids in Sweden.

1.4 Living conditions of older people

Most pensioners continue to live in their home environment. The older the person gets the more common it becomes that people move to sheltered housing provided by the community. Amongst 85-90 year olds, one quarter of the population live in houses adapted for the older person's requirements (Socialstyrelsen). The possibility to remain living independently is not entirely driven by health but also by other contributing factors. The extent to which the older person is able to choose is influenced by individual living conditions, but is also dependent on the availability of sheltered housing in the community.

2. Problem description and aims

'Aids for daily living' are one part of the rehabilitation resource that the community is able to offer the older person who suffers reduced functional ability. One form of aid may function as a substitute or as a complement to other supporting measures and impact positively on costs and quality of life for the individual.

The objective of this study is to: 'describe the everyday situation for a group of older women using the 4-wheeled walker and to determine to what extent it is possible to draw socio-economic and humanitarian conclusions on its use'.

3. Methodology

The study spans three different interview sessions with elderly women living in the region of Blekinge, conducted during 1988, 1999 and 2001. Common to all women is that at the time of the first interview they were more than 75 years old and living in their home environment, and that they had been prescribed a 4-wheeled walker as a walking aid. A study group composed solely of women was chosen to reflect the fact that women suffer ailments affecting the extremities and resulting in reduced mobility to a greater extent than do men.

The respondents were asked to declare an interest to participate in the study at the time the walker was first prescribed. Using this selection procedure it was possible to study the subjects both before and after the prescription of the 4-wheeled walker thereby enabling observations pertinent to the utility of the aid to be made over time.

The prescriber's task during the first study was to ensure that the patient fulfilled the prerequisites for the study, to provide information and to obtain the patient's consent to participate in the study.

In addition the prescriber submitted information for the study on:
• the objective of the prescription
• what activities the user was expected to carry out with the assistance of the walker
• diagnosis of factors causing the functional impairment
• time required for prescription and adjustment of the walker

In the first investigation, the participating study subjects were first **contacted a** few weeks after they had started to use their walker for the initial interviews.
The first follow-up investigation was carried out one year (+/- 1 month) after the first interview and the second investigation followed two years later. All interviews were carried out in the participant's home. The interviews were conducted on the basis of a pro-forma questionnaire which covered:

• Functional ability
• The need for assistance
• The participant's every-day situation
• The use of the walker and its importance as regards the participant's every-day life.

For the most part the questions were the same at the three investigations although some supplementary questions were added at the follow-up stages. The purpose of such ques-

tions was to shed light on obvious problems that were identified during the first and second investigations.

The Swedish version of (SIP) The Sickness Impact Profile (Sullivan, 1985; Herlitz, 1993) has been used to evaluate the functional ability. SIP consists of a standardised questionnaire which details the individual's concept of their own ability. Only the parts and categories that deal with walking, mobility, personal care and domestic work have been used in this study. Each positive reply to a statement in the SIP instrument gives a pre-determined importance that shows the degree of the functional impairment. The result of each category is summarised and expressed as a percentage of maximum function impairment.

In connection with the interview, a simple walking analysis and balance test were performed. The physiotherapist who conducted the majority of the interviews during the first investigation carried out all the interviews during the second and third investigations thus increasing the consistency of the results.

The criteria governing free issue of a 4-wheeled walker as a walking aid in the region of Blekinge have the following pre-requisites:
4-wheeled walkers may be prescribed to persons who, as a result of reduced functional ability, are unable to walk safely without assistance or only with the support of a stick. More than one walker may be prescribed when

- For practical reasons the same walker cannot be used indoors and out
- If the user's environment is split between different floors and there is no facility to move the walker between the floors

The calculation of the cost-benefit of the walker is compared with the alternative costs related to the increased assistance and support required if a walker is not used. The basis of the calculation uses hypothetical values based on the participating womens' own estimate of additional support which would have been required.

When differences are recorded between the investigations, these have been statistically tested for significance at the 5% level, i.e. the probability is less than 5% that the difference stated has occurred as a pure coincidence.

4. RESULTS

4.1 Analysis of drop-out

Only women continuing to live in their own home environment participated in the follov up investigations. Of the 59 women participating in the first investigation, 50 women remained during the second investigation and 30 during the third part. The women that had elected not to continue with the second investigation were not contacted again.

TABLE 1: Participants and drop-outs

Reason:	1st Investigation 1998	2nd Investigation 1999	3rd Investigation 2001
Died	3	5	
Moved to sheltered housing	1	6	
Moved away	1		
Did not want to or could not participate	4	8	
Participated	59	50	30

The drop-out rate in research with older people is an unavoidable problem. The drop-out rate during the third investigation was relatively high due to moves to other forms of living for the elderly, but also because of the older persons' reduced ability to participate in the investigation. Five of the women had died since the second investigation, eight were not able or did not want to participate and six had moved to sheltered housing and one woman had moved out of the region of Blekinge.

The prime reason for moving to sheltered housing was in two cases reduced state of health. Two women had strokes, one a femur fracture and another woman developed a heart murmur.

There were no differences as to how the women that had moved to sheltered housing per ceived their health during the first investigation compared with the third investigation. Looking at the total drop out rate for the group there were no differences how the drop-outs perceived their state of health compared to the remaining participants

4.2 Background data

In comparing the results of the third phase with the two earlier investigations only the 30 women that had participated in all three investigations were included. As the participant numbers are reduced the results are declared in rounded percentages and absolute numbers (in brackets).

Of the 30 women involved in this follow-up study two had given up the use of the walkel and were managing their mobility with a stick. The rest of the group was continuing to use their walker as their principal walking aid.

The average age for the group at the outset of the first investigation was 83 years. For the remaining women in the group at the third phase the average age was 87 years, with the oldest 97 and the youngest 79 years.

By the time of the last investigation, four of the women were widowed, which means that 85% (25) of the women during the last investigation were living alone. Only four were living with their husbands and one was living with children. None of the women had changed home between the later investigations.

4.3 Resources

Compared to the first investigation the requirement for additional support had increased. The need for using community transportation services (taxi) had increased. This form of support was used during the third investigation by 53% (16) women compared with 43% (13) using such transportation services during the first investigation.

The use of personal alarm systems had also increased from 30% during the first investigation up to 46% (14) during the last follow-up.

Half of the women declared that their need for support had increased. A home assistance service in various forms was being used by 60% (18) of the women. During the first investigation only 37% (11) used home assistance services. The average use of home assistance services was on average 11 hours per month, which also represents an increase.

Of the women 13% (4) used "medical services" and an equal number declared that they were using private home help. During the two years that had passed since the first investigation one third of the women had received consultations by an Occupational Therapist and the same number had consultations with Physiotherapists. A quarter of the women had also received physiotherapy treatment and gait training.

4.4 The use of the 4-wheeled walker

Most of the women in the group reported that their mobility was poor or relatively poor, which is reasonable, as they had been prescribed their walker three years ago. Half of the women regarded that their mobility had slightly improved since the investigation two years ago. The reasons for their improvement were expressed as follows:

- Got used to walking with their aid
- Felt safer, dared to walk more
- Regular walks to the shops
- Walks safely with the walker - and practise Qui Gong once a week
- Don't want to give up - is stubborn - practices by taking regular walks
- Walks a lot outdoors as the relatives are "nagging for me to walk"
- Walks much better and more upright since using the walker
- Walks 5 km every day
- Reduced giddiness
- Been prescribed new medicine which has helped
- Daily walks
- Is also walking indoors with the walker after a fall
- Exercising and training with a physiotherapy program

4.5 The compensating effect of a 4-wheeled walker

Older people often suffer reduced multi-functional abilities. Some reduced functional abilities are regarded as normal in the ageing process, while others are due to chronic pro gressive illness. Certain reduced functional abilities affect the whole life situation while others affect limited areas.

The 4-wheeled walker can compensate to a high degree for reduced functional ability when the mobility of a person is affected. There are other reduced functional abilities such as severely reduced sight, where the rollator can only partially compensate. To get a view on the compensating effect of the 4-wheeled walker on different reduced functional abilities affecting the study group of women, an assessment on a scale of 1-6 was used to judge to what degree the 4-wheeled walker partially compensated for their loss of functional ability.

TABLE 2. To what degree does your 4-wheeled walker compensate for your reduced functional ability? (n=28)

Compensation	Proportion
Fully compensated	25% (7)
To a high degree compensated 1-3	36% (10)
Low compensation 4-6	32% (9)
Not compensating	7% (2)

Two women had stopped using the walker, whereas all the other women were using the walking aid outdoors. The two women that no longer had a need to use their walker had not answered the question. In excess of 60% experienced that the walker to a very high degree compensated for their reduced functional ability, whilst less than 40% found that that the walker compensated to a limited level or not at all. The level of perceived compensation remained unchanged between the investigations.

During the first investigation nearly half of the women were found to have skeletal and muscle impairments which resulted in the prescription of the walker. The findings indicate that their functional disability had been compensated by the use of this aid.

The table below demonstrates how the women used their walker outdoors.

TABLE 3. The use of the walker outdoors when walking/shopping/walking to the bus or car.

Activity	Proportion
Walking outdoors	75% (21)
Shopping	46% (13)
Walking to bus/car	72% (20)

Several patterns of use for the walker were reported by each individual. Two had stopped using the walker altogether whilst three quarters of the women were using their aid when

out walking. There were no differences between the women that had fallen and those that had not fallen in terms of how they were using their walker when outdoors.

During the third investigation a significantly higher number of women, compared to the first investigation, reported that they were also using their walkers indoors. During this latter study 55% (15) of the women used their walker indoors, compared to 25% (7) during the first investigation. As more women reported that their health had declined, this may be the reason that more were using their walker indoors. Another reason may be that they became used to using the walker outdoors and it therefore became more natural to also use it indoors.
The women not using their walker indoors reported the following reasons:

- *have no need to use a walker indoors*
- *feel safe with the stick*
- *wish to have a smaller walker*
- *the walker is too large indoors*
- *prefer to support myself on furniture indoors*

All of the women using a walker reported that they felt safe when using their walking aid. This is a very important aspect as 'feeling safe' is a pre-requisite for using a 4-wheeled walker.

On the question "Are you using your walker more or differently now, compared to the first investigation," the following was reported:

- ***Did** not use my walker very much in the beginning*
- *Have problem in that my walker may not be parked in the entrance of the house and I must use the lift to collect it, which is inhibiting*
- *Using my walker as an "assistant" when I do my chores in the house*
- *Using my walker more since the foot injury*
- *Using the tray more now than in the beginning*
- *Using the walker nowadays instead of my crutches indoors - nearly blind*
- *General decline in health - using the walker for support to get out of bed*
- *Always using my walker since I fell when outdoors*
- *Heart condition- not allowed to lift anything, using the walker with the tray indoors*
- *Walking **a lot more outdoors with my** walker*
- *Always using the walker indoors nowadays*
- *Using the walker much more outdoors*
- *Using the walker both in and outdoors*
- *Stopped using the walker - managing with my **stick***
- *Stopped using the walker - health improved*

On the question concerning any problems with their walker the following comments from 25% (7) of the women were reported:

- the walker feels unstable
- the handles are placed too far away from the body
- the basket is difficult to manage when the eyesight is poor
- aching shoulder -because of the handle placement
- **the** walker pulls to one side and is difficult to brake
- would like a lighter walker

Most women in the study group 75% (21) **had** used **the** same walker all the time and wen satisfied with the one prescribed.

TABLE 4. Distribution of other aids at the 1st and 3rd investigation

Aids 1 st Investigation		2nd Investigation
Walking Stick	37% (11)	83% (25)
Bath/Shower Aids	43% (13)	60% (18)
Raised Toilet Seat	20% (6)	53% (16)
Gripping Pliers	27% (8)	41% (14)
Device for putting on hosiery	13% (4)	10% (3)
Work Stool	0% (0)	10% (3)

The number of other aids that the women used had increased between the two investigations. Most women also used a walking stick as an aid. Nearly half of the women were at the time of the third investigation also using aids to assist them with their hygiene, which improved their ability to independently manage their hygiene and dressing requirements.

4.6 Accidents due to falls

Accidents due to falls are a common and a very serious problem. Elderly people who have 4-wheeled walkers have fewer falls because the aids make walking safer. It is a well-known fact that the majority of falls occur indoors during the day, but also during the night in connection with visits to the toilet. The results from the three investigations showed that, where falls had taken place, the women had not been using their prescribed walking aid when their fall had occurred.

TABLE 5. Falls and injuries due to falls occurring up to one year before 1st investigation, between 1st and 2nd investigation together with 2nd and 3rd investigation (n=30)

Falls/injuries clue to falls	1st Investigation	2nd Investigation	3rd Investigation
Fallen occasionally	47% (14)	37% (11)	23% (7)
Injuries due to falls	*Fractured ankle* *Sprained ankle* *Fractured upper arm* *Fractured pelvis* *Cuts to head* *Fractured wrist* *Cuts to foot*	*Rib Fracture* *Fractured wrist*	*Knee-ccp* *Factured pelvis* *Factored pelvis* *Rihfractures* *Soft tissue injury*
Fallen several times	3% (1)	10% (3)	23% (7)
Injuries due to falls	*Cuts to the head*	*Vertebral compression*	*Hip fracture* *Soft tissue injury* *Cuts to the head* *Wrist fracture*

During the first investigation the women were asked if they had fallen during the past year (the year before they were prescribed their walker), and if they had received injuries due to that fall. Half of the women reported that they had fallen one or more times during that year. Eight of the women had received injuries.

During the first year after the women had received their walker and up to the second investigation a year later 47% (14) of the women fell one or more times and 10% (3) received injuries due to the falls.

Between the second and third investigation two years had passed, which equals twice the time as compared to the investigation between the first and second investigation. During this time 47% (14) of the women fell and 30% (9) of these were injured due to the fall.

At the time of the third investigation half of the women reported that they were afraid of falling. The women that had already had a fall were more frightened. The women were mostly afraid for falling indoors during the day, whilst three of the women said that they were also afraid of falling during the night. The same number was afraid of falling when **outdoors.**

One third of the women had not fallen at all during the three years they had been using their walker.

TABLE 6. Injuries due to falls recorded during the third investigation and the reason for the fall

Injury	Cause of injury	Mobility aid used
Wrist fracture	*Fell whilst walking (outdoors) day*	*Walking Stick*
Soft tissue damage	*Fell whilst walking (outdoors) day*	*Walking Stick*
Fractured knee-cap	*Fell over the carpet edge (indoors) day*	*None*
Fractured pelvis	*Opening cellar door, lost balance (indoors) day*	*None*
Fractured pelvis	*Overcome by dizziness (indoors) day*	*None*
Hip fracture	*Serving coffee- lost balance (indoors) day*	*None*
Cuts to the head	*Out of bed during nightime toilet visit*	*None*
Fractured ribs	*Visit to toilet (night)*	*None*
Soft tissue injury	*Visit to toilet (night)*	*None*

The injuries due to falls recorded during the third investigation occurred during the day among 20% (6) of the women, whilst 10% (3) occurred during the night in connection with visits to the toilet. Only 6% (2) of accidents occurred outdoors. Walking aids were used only in the two falling accidents that occurred outdoors and no accidents due to falls occurred when the women had used their 4-wheeled walking aid.

Of the 47% (14) that had fallen during the last two years, (8) reported that their mobility was poor and (9) perceived their health to be weak. Of the (14) that had fallen (12) suffered often or sometimes from dizziness, (11) had severe sight impairments and (10) used sleeping tablets.

The women that suffered falls were using barbiturates to a higher degree. Dizziness was also more common among the women that had fallen than among the group that had not.

Fewer women among the group that had fallen as compared with those that had not fallen perceived their health and mobility to be impaired.

Among the (7) that had fallen several times, all reported using sleeping tablets and suffering from dizziness and impaired eyesight. These women had also fallen between the first and second investigation and were doubtless prone to further falls in the future.

4.7 Health and functional ability

Two thirds of the women in the study group perceived their health to be poor and also perceived that their aches and pains from shoulders, extremities and joints were the symptoms that mostly impacted on their health. More than half reported that they experienced aches and pains on a daily basis.

During the first investigation the prescribers recorded information about their diagnosis ol the study subjects that was crucial to a decision on the prescription of their walking aids.

Almost half of the women had trouble that came from skeletal or muscular problems. The most commonly identified impairment was lack of or reduced mobility and the next most common were circulation problems.

In excess of two thirds of the women perceived their health to be reduced since the last investigation. Nearly all of the women reported that their impaired health stopped them from doing things which they wanted to do.

The Sickness Impact Profile (SIP) is a questionnaire with a number of standard questions and has, in this investigation, been used to judge the individual's perception of their own functional ability. The areas covered in this study are personal care, mobility, walking (gait) and household work. Each category consists of a series of questions with a predetermined weight (value). These values are totalled for each category and expressed as a percentage of maximal reduced functional impairment. The higher the value, the greater the functional impairment.

TABLE 7. The mean valu e of functional impairment (SIP-value) expressed as % during the three investigations.
Higher values represent g reater impairm ent. (n=29)

Categories	1st	2nd	t-test	3rd	t-test
Personal Care	13.3	13.4	no sign	15.8	no sign
Mobility	21.7	29.5	0.013	26.4	0.049
Walking	28.2	30.0	no sign	32.3	0.097
Household work	30.5	37.1	no sign	41.3	0.032

The SIP value/result has increased for three out of four categories between 1st and 2nd investigation, but it is only in the mobility category where a significant reduction is seen. Although the differences of SIP value for domestic work is great between the first and second investigation, the difference is not significant due to large standard deviation.

The changes between the 2nd and 3rd investigation show a significant reduction of the value for household work and for walking. The requirement for increased communal

assistance has increased between the investigations, which agrees with the reduced functional value for household work.

The value for mobility has seen a significant improvement compared to previous investigations which indicates that the women perceived their mobility in some aspects to be improved. The changes of the functional value between the investigations correspond with the answers that the women had provided. Half of the women reported that their mobility had improved since the previous investigation.
The SIP value has been tested against how the women perceived their own state of health. The women that judged their health as poor or rather poor also had high SIP values. There are no differences in SIP values between the women that had fallen and the ones that had not.

4.8 Sleep Quality

The group of women that reported problems with insomnia had increased from 47% (14) to 63% (19). The women reporting insomnia all had different ways of managing their problem. In addition to taking their prescribed pills, several reported getting up to eat something or simply walking around for a while to get settled.

Of the 53% (16) using sleeping pills, half were using some form of Benzodiazipines. The regular users of these substances had been using them over a long period. As this medication affects muscles, balance function and reaction time, the risk of falls and consequent fall injury is increased. Older persons exhibit a slower metabolism process with this pharmaceutical that frequently leads to drowsiness the day after intake.

Nearly 70% (20) of subjects in the study group reported suffering often or sometimes from dizziness. Dizziness is common among older people and affects the quality of life as it reduces mobility. It is not surprising that such a large proportion of the women reported dizziness as the median age of the study group was high and general health was perceived to be poor.

4.9 Vision and hearing

Some reduction of vision and hearing is a natural part of the ageing process whilst greater reduction may be caused by disease. 30% (9) of the women had severe problems with their hearing and a further 40% (12) reported that they had some problems with their hearing. Nearly 40% (12) of the women used a hearing aid. 40% (12) of the women reported severe problems with their sight, while 30% (9) reported some sight problems. In addition to using spectacles, 22% (6) also used other forms of aids to improve their vision. There were no differences in sight and hearing levels reported between the investigations.

4.10 Urinary incontinence

Urinary incontinence is a widespread public health problem. The problem is treated with different medical interventions and many of the methods have good results. The definition of this ailment is involuntary urine leakage that is easily proven. The problem for the individual is both social and one of hygiene. The incidence is increased by age and is more common amongst women than men. The prevalence is around 25% at the age of 80

years and above 50% for people cared for in institutions. In higher age brackets the incontinence is often related to other illnesses and a general reduced state of health.

The most common treatment of urinary incontinence involves the use of absorbing pads. The public health costs for pads for incontinent people alone during 1996 was 100 million Swedish Kronor (SBU 2000) and is likely to be higher today.

47% (14) of the women in the study group reported suffering from urinary incontinence. The results also show that four out of five women were compelled to use the toilet during the night. While visiting the toilet at night, five women had fallen and three were injured. To avoid going to their toilet during the night five women reported that they would be prepared to consider other aids such as a commode near the bed and three of four women would consider a chamber pot near the bed. None of the women was using these aids during the period of the study.

Of the women that had reported suffering from urinary incontinence 10 had sought medical advice and 5 were being treated. Two had received surgery while the rest had received other treatments. Half of the women managed to use simple thin pads and the others used the thicker day and night pads.

4.11 Gait analysis

A gait analysiswas carried out during all three surveys with the aim of determining if the gait pattern had changed when the 4-wheeled walking aid had been used over time. At the first survey, half of the women showed a slightly disturbed gait pattern. During the analysis, pace, length of step, width of step, rhythm, confidence and centre of gravity were measured. For women who relied on medical aids the distance between the aid and the body was also measured.

By the third investigation eighty percent of the women executed the walk test using aids. Half of these eighty percent used the 4-wheeled walker and the other half used a walking stick during the walking test.
At the previous investigation 50% of subjects used aids in the walk analysis at the first investigation the number who used aids was 33%.

At the third investigation half of the women had normal length of step, normal width of step and walked confidently. Out of the ones who were walking with walking aids in the walk test, half of them placed the walking aid far forwards. The other half had normal walking-aid placement One third of the women had normal 'fellow-movement'. The result does not differ from the two previous investigations.
Ninety percent of the women had a shift in centre of gravity at the third investigation. This shift was greatest forwards at the time of the first investigation, when the women to a greater extent showed normal walking rhythm.

By the latest investigation the shift in centre of gravity was greater sideways, which correlated with the fact that the part that showed a limping walk had increased. The SIP-value for gait (pagel5) showed deterioration by the two latter investigations. A limping gate is of course a sign that certain problems have developed.

4.12 Balance test

A simple test was carried out to study balance ability. Three test exercises from Bergs balance scale were used (this scale measures the balance during 14 common movements). The balance was judged on a scale from 4-0 in the three exercises. The exercise was done in all three surveys. The results from the 1st and 3rd test are as follows:

EXERCISE 1 - Standing without support.

The women were instructed to stand without support for two minutes. To score one point several attempts could be made.

		1st Investigation (n=30)		3rd Investigation (n=29)	
POINTS	%	No.	%	No.	
Can stand steadily/or 2 minutes	*4*	*50*	*(15)*	*31*	*(9)*
Can stand for 2 minutes with encouragement	*3*	*20*	*(6)*	*28*	*(8)*
Can stand for 30 seconds wlo support	*2*	*20*	*(6)*	*21*	*(6)*
Need several attempt to stand for 30 seconds wlo support	*1*	*3*	*(1)*	*3*	*(1)*
Can t stand for 30 seconds without support	*0*	*7*	*(2)*	*17*	*(5)*

EXERCISE 2 - Standing and picking up objects from floor.
Instructed to pick up shoe/slipper placed in front of the feet

POINTS	%	No.	%	No.	
Can pick up object with confidence	*4*	*57*	*(17)*	*38*	*(11)*
Can pick up object with encouragement	*3*	*28*	*(8)*	*38*	*(11)*
Can't pick up the object, but can reach 2.5-5 cm away from the object maintaining their balance	*2*	*10*	*(3)*	*7*	*(2)*
Can't pick up the object and needs encouragement during the trial	*10*	*(0)*	*7*	*(2)*	
Can't make an attempt, needs support not to lose balance	*0*	*7*	*(2)*	*10*	*(3)*

EXERCISE 3 - Rotating 360 degrees.
The women were instructed to rotate 360 degrees, then stop and then to rotate in the opposite direction.

POINTS	%	No.	%	No.	
Can confidently rotate 360 degrees in 4 seconds or less	*4*	*14*	*(4)*	*21*	*(6)*
Can confidently rotate 360 degrees one way only in 4 seconds or less	*3*	*23*	*(7)*	*0*	*(0)*
Can slowly but surely rotate 360 degrees	*2*	*33*	*(10)*	*10*	*(3)*
Need support and verbal guidance	*1*	*7*	*(2)*	*17*	*(5)*
Requires support during the rotation exercise	*0*	*23*	*(7)*	*52*	*(15)*

During the third investigation, one of the respondents was unable to participate in the balance test. •:

One third of the women demonstrated good balance in the 1st and 2nd exercises, which involved standing without support and picking-up things from the floor. The remaining participants had some difficulty in performing the exercises. In the 3rd rotation exercise the majority of women had great difficulty. Half of the women could not rotate without support. Compared to the first investigation the balance ability of the whole group had deteriorated.

5.The Socio-economic Cost Benefits of the 4-wheeled walker

Part of the purpose of this study was to show the public health cost-benefit of this form of aid and this section is a foundation for further research of the economic benefit of the 4-wheeled walker. The women's own view on what other form of support they would perceive themselves to require, if they had not been prescribed their walker, was obtained and the cost implications of those alternatives was assessed. The public health cost-benefit is also estimated by a comparison of the cost of a hip-fracture in relation to the cost for a 4-wheeled walker.

To describe the cost-benefit two alternatives are compared. When comparing the impact and effect of the walker as compared to other forms of assistance some methodological problems occur. There are no real alternatives to a walker when support is required outdoors. Walking sticks cannot be compared as an alternative, but may be seen as complementary to the walker. The alternatives are therefore outdoor mobility with, or without, a walker. Without a walker, alternative costs are undoubtedly incurred in the form of increased personal assistance required. Since, in this study, there was no control group in this category that could be used for the purpose of comparison, the individual's perception of what support would have been required in the absence of a walker was used as the most appropriate proxy for approaching the cost calculations.

During the three investigations, the participants made a subjective estimate of the assistance they thought they would have needed if they had not had their walker. The estimated increased assistance/support costs are compared to the cost of a prescribed walker. The women may have over-estimated their need for support, but it is difficult to achieve a more reliable need assessment, as it would be ethically and practically impossible in Sweden to deny a control group the use of their walkers.

TABLE 8. The number with increased need of assistance, the total number of occasions/month, mean number/month for the whole group during 2nd and 3rd investigation (n=30)

Form of assistance	*2nd invest. No's with need of assistance*	*3rd invest. No's with need of assistance*	*2nd invest. occasions per month (total)*	*3rd invest. occasions per month (total)*	*2nd invest. occasions per month (mean)*	*3rd invest. occasions per month (mean)*
Transportation service	*2*	*9*	*9*	*115*	*0.30*	*3.83*
Home food delivery	*11*	*11*	*77*	*130*	*2.57*	*4.33*
Home assistance	*1*	*2*	*4*	*35*	*0.13*	*1.15*
Private	*2*	*3*	*11*	*55*	*0.37*	*1.83*

During the second investigation only two of the women perceived that they would require increased transportation service if they had not had a walker. During the third investigation this number had increased to nine. The results show that the women who estimated that they needed the transportation service judged that they would need to use it more often.

More than a third of the participants, in both investigations, considered that they would have needed assistance with food being delivered home, if they had not had the use of the walker. The frequency of such service was estimated to be higher during the later investigation. In addition, the projected requirement for other types of home assistance increased from 4 to 35 occasions per month. The anticipated need for private assistance had also increased. The study group's total estimated number of assistance occasions had increased for all services theoretically available.

Compared to the previous investigation, the increased requirements for support are reasonable as the women also reported that even with the aid of a walker the need for extra help had increased. The perceived declining state of health is, of course, the reason why the extra support would be required.

5.1 The cost of increased care support as an alternative to the walker

The cost of a walker in this study is estimated at SKR 2,400 per walker. This cost includes the procurement cost of the walker, the community aids centre's cost of repairs, maintenance, service, transportation, storage, administration etc. A walker is written off over 4 years, which is currently accepted accountancy practice for this kind of equipment. The annual cost of one walker is therefore SKR 600.

The prescriber's hourly rate is estimated at SKR 320 and the time to assess a person for a walker, including travel time, phone calls etc., is estimated to be 2.5 hours, thus totalling SKR 800. Mileage cost for the therapist is estimated at SKR 162 (60km x SKR 27/1 Okm). The cost in relation to testing and follow up has been estimated at SKR 962 per walker and so the cost over 4 years equals SKR 240 per year.

Below the estimated costs of the anticipated increased support requirement in the absence of a walker are given:

The transportation cost for the community is SKR 6.30/km, when several passengers are transported. The average distance is estimated to be 2.5km in each direction or 5km per each occasion. This service was estimated to be required 3.83 times per month at a monthly cost of SKR 121.

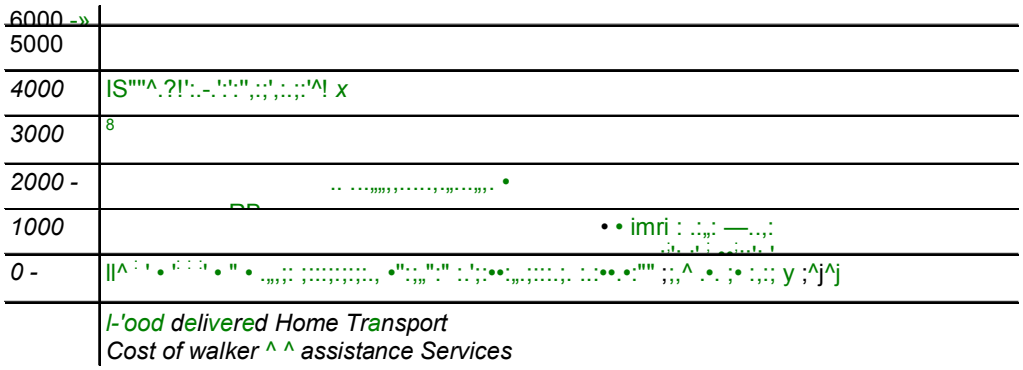
The community cost for home assistance is estimated to be around SKR 184/ hour **and** the minimum time required is half an hour. The total cost for food delivered home **on an** average 4.33 occasions amounts to SKR 398/month.
Other home assistance support required was estimated to 1.15 hours per month at a cost of SKR 212/month. The private help is mostly unpaid labour and is carried out by friends **or** relatives. This cost is excluded, although it may be regarded as a public health cost.

TABLE 9. The average cost of one year's use of a walker compared to one year's increased community assistance in the absence of a walker				
The cost for a walker p.a.	*The cost for increased support p.a.*			
The cost of the walker including transport and maintenance	*600:-*	*Food delivered home* *Home assistance*	*2840:-* *290:-*	*4780:-* *2540:-*
		Transportation Service	*110:-*	*1450:-*
All associated prescription costs & follow-up	*240:-*			
Total	*840:-*	*Total*	*3240:-*	*8770:-*

The estimated community support requirement has increased over time which results in a large increase of costs for the anticipated support services required. At prevailing costs foi transportation service and home assistance the difference in cost between the 'with walker' and 'without walker' situation was SKR 2,400 for the second investigation, but SKR 7,930 for the third investigation.

This comparison proves that the 4-wheeled walker is a good national economic and public health investment and also the economic benefit for the user increases over time. Obviously, there are several alternative approaches which the community health programme could take to meet the anticipated additional support requirements. For example, although the option to use the transportation service to shop for food may not be the least expensive option, all other options also have a price. Even if the community costs were shown to be lower than the calculation made in this study, a cost comparison of this type is essential and should be included in any debate on the comparative costs of interventions for the older generation.

DIAGRAM 1 - Cost of walker as compared to alternative interventions as of third investigation.



5.2 The public health costs of hip fractures

When calculating costs for hip fractures it is common to use only the 'acute' cost associated with the operation and care costs. This cost is only part of the associated costs of hip fractures (Sernbo, 1993). The 'aftercare' costs have been studied and found to be 59% of the total, accrued costs that are incurred during the first year after a hip fracture (Zetraeus, 1997). The increased volume and cost of additional services required have been estimated in a study by Zethraeus and Gerdtham (1998). The subjects for this study comprised 1,080 elderly women in Stockholm who had an operation resulting from a hip fracture. The authors have calculated what costs could be saved if hip fractures could be prevented. The direct costs created in the course of one year after a hip fracture have been compared with the actual costs incurred in the year before the hip fracture. The difference between these costs for patients who survive one year after a hip fracture is described as the 'external hip fracture cost'. The costs are age-related which means that the costs increase commensurate with increasing age. At an average age of 81 years a typical 'external hip fracture cost' in 1998 was SKR 210,000.

If the incidence of hip fractures can be reduced to some degree by older women using a 4-wheeled walker as a walking aid, considerable public health costs can be saved. One walker costs SKR 2,400 according to calculations earlier referred to, which represents 1% of the additional public health costs that are created by a hip fracture.

6. Discussion

Most elderly people can manage their everyday situation up to an advanced age. Problems occur when various reduced functional abilities set in and the older person becomes dependant on support from relatives and the community.

Reduced mobility, with increased risk of falls and injuries caused by falls, is a problem which increases with progressing age. In this study, a group of elderly women with functional impairments were interviewed on three different occasions with a view to evaluating the usefulness of the 4-wheeled walker as a walking aid, looked at both from the individual's perspective, but also from the public health cost-benefit viewpoint.

Accidents and consequent injuries due to falls result from many different factors. To completely eliminate or eradicate falls may be a Utopian ideal but this must not inhibit efforts to do so and all areas should be examined to reduce the risks of such falls occurring. Every year approximately 18,000 Swedish people suffer hip fractures, causing much personal suffering for the individuals involved and incurring large public health costs.

The women participating in this three-year study have used their walkers as their primary walking aid to a greater extent each year. They perceived their general health to have declined, but have continued using the walker as a support that has enabled them to remain active and mobile and has led to improved mobility. Despite their declining health their incidence of falling has not increased and accidents due to falls have not occurred when they were using their walker, but on occasions when the walker was not in use.

Indoors, only half of the women used their walker. That is an increase from the earlier

investigations, but the need to use the walker is probably greater than the actual use of it. Within this group, the reason that the walker was little used indoors was probably that the women considered the walker to be unnecessary when only a few steps were required and that the walker was superfluous in this situation. In fact, the majority of falls occurred at home when the walker was not in use.

Older people commonly experience dizziness that affects both balance and therefore the risk of falls. The balance tests performed during the investigation shows that balance had deteriorated and that the women had major problems during the rotation tests. For more than half of the women in this study the balance impairments constituted an obvious risk of falls and injuries even during simple short walks and movements without support.

To what degree the sustained use of a walker may impact negatively on balance training within a rehabilitation programme could not be addressed in this study, as other variables could not be kept constant (reduced state of health, impact of drugs, etc). If a negative impact to some degree was established, this would need to be seriously considered and weighed together with the other positive effects on the health and quality of life for the individual which have been clearly demonstrated in this and other studies. If the older person is afraid to move around for fear of falling, there is no question of a positive outcome from balance training and such a fear may contribute to other negative consequences for the individual's health.

Half of the women in the study were, to a greater or lesser extent, using sleeping tablets regularly. Of these, half of the women were using some form of Benzodiazipines, which can cause drowsiness as a side effect the day after ingestion. The nighttime visit to the toilet is a large risk factor for falls. With impaired sight, poor balance and under the influence of barbiturates, this risk is, of course, increased. To avoid or reduce the risk of falling when visiting the toilet, the women who had fallen reported that they could consider some form of toilet aid placed near the bed. As four out of five women reported going to the toilet during the night there is a good reason to review the risks involved and to consider prescribing a toilet aid (commode or chamber-pot) to be kept near the bed.

All forms of aids as well as other support resources for older people incur economic and social costs. It is, therefore, in the interests of both community and government officials to consider optimal alternatives that are also acceptable for the user. As the individual's needs increase with progressing age, different alternatives must be examined and judged over an appropriate time period. To be able to shed light on this in a simple way, the women in this study were asked to estimate their requirements for other forms of support in the event that they had not been prescribed their 4-wheeled walker. In addition to the loss of beneficial effects on health accruing from an active life with regular walking exercise, all of the women estimated that the required ancillary support would increase over time with progressive age. A cost comparison demonstrated that an estimated, increased cost of services of some SKR 7,900 per person per year was incurred if the walker was taken away. This calculation was based on the information provided by the study subjects and there may be a possibility that the women had over estimated their need for support. However, the magnitude of the cost differential was such that, even if the true costs for ancillary services were shown to be considerably lower, the additional costs would still b highly significant when compared with the annual cost of 4-wheeled walker provision.

We know from past research that hip-fractures constitute a major public health cost. If just one hip fracture can be avoided and the associated additional costs over one year not incurred, a saving in excess of SKR 200,000 is made. The typical cost of a 4-wheeled walker is only 1% of that amount and seen from that perspective the walker must be considered as an inexpensive, cost-effective fall prevention aid. The study does not demonstrate that accidents due to falls can be completely avoided with a walker, but it is probable that the walker can significantly reduce such risks.

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