An ounce of prevention
is worth a pound of cure
– Preventive home visits among seniors

Klas-Göran Sahlén
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Epidemiology and Public Health Sciences
Department of Public Health and Clinical Medicine
Umeå University
SE-901 87 Umeå, Sweden

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The front page is painted by Angél Maximo Lómas.
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Abstract

The aim of this thesis is to contribute to existing knowledge. If the knowledge is not useful in building society it has limited value. In order to be a tool for decision-makers, Preventive Home Visits (PHVs) are described and discussed according to a realist synthesis approach. The premise of this approach is that a single trial cannot tell the whole story and that understanding the outcome pattern is much more important than seeking regularities in results across different trials. In order to understand the outcome pattern, the PHV strategy in Nordmaling is examined against other trials and scientific work, and also in grey literature such as reports and working-papers.

An increasing population of seniors means that resources for health and elderly care are being scrutinised in order to achieve the best possible health for the money invested. PHVs represent one strategy that attempts to promote health among independent seniors. This thesis is a multidisciplinary study aiming to gain knowledge about the effects of PHVs and to understand the mechanisms of importance when implementing this particular strategy. The point of departure is a study conducted in Nordmaling in the north of Sweden among healthy seniors aged 75 years and over.

The study, conducted as a controlled trial during 2000 and 2001, showed a decrease in mortality as well as the utilisation of care, and an improvement in indicators of perceived health. Cost analyses showed significant savings for the municipality following a reduction in the use of home help. These and other savings combined with costs of the intervention were related to saved life years and used to conduct health economic analyses. Medical and social records from the primary health centre and the municipality, along with official registers provided information for modelling health economic analyses from a lifetime perspective. Results showed that the costs of PHVs were less than 10 000 Euros per gained life year, against an acceptable level of cost effectiveness of 50 000 Euros. Using a shorter time perspective, the result was even more favourable for PHVs. It was evident that the time window used in the analyses, the normative choice of including future healthcare costs or not, and how to handle the value of the seniors’ production were important factors in determining the results.

Two years after the trial, in-depth interviews were conducted with 5 seniors who had experienced PHVs, in order to gain understanding of the outcome of the PHV trial in Nordmaling. Participants were selected with respect to their health and how they responded to advice given during the PHV trial. Grounded Theory was used to analyse the interviews. Seniors who used autonomous coping strategies in everyday life gained less from PHVs than other seniors. All participants could benefit from PHVs, but in order for these to be successful it was important for the home visitor to be professional and to understand how the different coping strategies of seniors worked.

Taken together, the different aspects of this study raised normative questions that are discussed in this thesis. One, whether the production of seniors has any monetary value in health economic analyses conducted from a societal perspective, was addressed in a smaller diary study where 23 seniors were asked to keep a diary in order to identify everything they did over a one-week period. It was evident that most of the respondents “produced” a lot, however the production of seniors is rarely taken into account in health economic analyses. The concept of “senior production” includes both the market value of what seniors do, as well as the value of what society can avoid doing if the seniors are independent and healthy.
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Doctoral Theses from Epidemiology and Public Health Sciences 1987–2009
Abbreviations

**PHV**  Home visits to seniors living independently. Aimed at multidimensional evaluation of their problems and resources, stimulating them to adopt or maintain a healthy lifestyle, and to provide information and emotional support.

**ITT**  Intention To Treat; an analysis based on the population intended to treat, not the population that actually received the administered treatment.

**OT**  On Treatment; an analysis based on the population who actually received treatment, excluding drop-outs.

**RR**  Relative risk; In this setting it is a ratio of the probability of an event occurring among those who received preventive home visits versus the control group.

**IR**  Incidence Rate; the number of new cases in the cohort during a time period per unit of total ‘person time at risk’.

**QALY**  Quality Adjusted Life Years; a measure of health that includes both quality and quantity of life years lived.

**EQ-5D**  EuroQol 5D; a standardised questionnaire (with 5 dimensions) to generate a numerical measure of health related quality of life.

**CEA**  Cost Effectiveness Analysis; a health economic method that yields a measure of costs and effects expressed in some natural unit (i.e. Euro/healthy senior, Euro/avoided hip-fracture, or Euro/life-years gained).

**CUA**  Cost Utility Analysis; health economic method that yields a measure of financial costs and effects expressed in QALY or DALY (i.e. Euro/QALY).


**IADL**  Instrumental Activities of Daily Living enable the individual to live independently and consists of these tasks; Light housework, preparing meals, manage medication, shopping, using the telephone and managing money. *(From: Bookman, A., Harrington, M., Pass, L., & Reisner, E. (2007). Family Caregiver Handbook. Cambridge, MA: Massachusetts Institute of Technology)*
Original papers
This thesis is based on the following papers


Paper I and II are reprinted with permission of the publishers.
Prologue

Since graduating as a nurse I have worked with elderly people. This work has given me many positive experiences, and has made me the person I am today. I have come to realise, however, that we can do much more for the elderly and have tried to do this as a nurse in different nursing homes in the north of Sweden in Ånäset, Hällnäs, Nordmaling and Rundvik.

A problem became evident to me when a seventy year old lady, who we shall call Aunt Liz, became unnecessarily dependent and isolated, having been a healthy and active woman. She had always been able to manage everyday life despite severe back pain, although received support from her daughter with physically demanding tasks. One winter her kick-sled was stolen or borrowed without permission, which was the starting point for her functional decline.

Aunt Liz didn’t want to buy a new kick-sled because hers might be returned, and didn’t want to get a walking frame on wheels for outdoors because she may be perceived as old. Instead, she received more help from others with several practical things. Her balance became worse, she no longer participated in dancing activities and became more and more isolated. She began to complain more, which caused tensions with some of her friends.

Finally, Aunt Liz was persuaded to get, and start using, a walking frame on wheels for outdoors. Unfortunately her balance was very bad and the very first time she used it by herself she fell and got a fracture. This was the starting point for a period of hospital use and dependency during her remaining lifetime, and the initial point of departure for my own commitment to prevention instead of treatment or managing dependency; in other words, to avoid the fire to begin with, instead of extinguishing an already burning flame.

I soon realised that many others have had the same thoughts, one of whom was David von Schulthenheim, a Swedish physician born 1732. He is perhaps most famous as the professor who started and managed Sweden’s first maternity hospital, but was also the first chairman and president of the Kongliga Sundhets kollegium (Royal Healthiness Fellowship), which today is Sweden’s National Board of Health and Welfare.

Von Schulthenheim gave a speech on 4th May 1763, entitled “How to reach good age” (Om den rätta ålderdomens uppnående), in which he outlined how everybody should behave in order to reach old age. Fifty-seven years later, this speech was printed as a book, and it became obvious that lots of knowledge about health and old age was already known in 1763.

Aunt Liz and David von Schulthenheim triggered my commitment to find out how to act to promote health in old age.
Introduction

The first part of this thesis attempts to describe how my starting point – meets with the demographical situation and how health economic methods include production by old people or seniors. I prefer to use the term ‘senior’, as this seems less connected with prejudices compared with ‘old people’, ‘aged’, or ‘pensioners’. This introduction also discusses preventive home visits (PHVs) among seniors, according to a methodology described by Ray Pawson [1]. His realist synthesis approach is an important contribution to the discussion of how complex interventions, actions, or methods can be scrutinised and evaluated with the explicit purpose of being used in policy-making in different settings and contexts.

The second part of the thesis describes the PHV trial in Nordmaling. The different methods, including a cohort and case-control study, cost-effectiveness analysis (CEA) and cost utility analysis (CUA), an interview study and a diary study, are all described.

The third part builds on these methodological descriptions and presents the results from each of the methods used. The results are then discussed at the end of this section.

The thesis concludes with a summary from a policy-maker’s perspective, which also includes a short description of what has happened with PHVs after the trial, in the municipality of Nordmaling, the county of Västerbotten, and in Sweden more generally.

Demographic transition entails prioritisation

Economic development has enabled improvements in standards of living. This is something good, but an outcome that automatically results in demographic changes. This demographic transition will have a major impact on societies in the future, affecting individuals, companies and governments.

This rapid change provides lots of opportunities; however it can also hamper development in some countries. In 2002, 440 million people worldwide were aged more than 65 years (7.1%), and this figure is expected to double during the coming 25 years[2]. Currently, 18% of the Swedish population is more than 65 years old, a proportion that is projected to rise to 24% by 2050 [3]. This demographic change will probably be more significant in the least developed countries[4], however the change will be significant worldwide. It is difficult to predict these figures and, at least for developed countries, they may be an underestimation. An underestimation of the future life expectancy at birth, and an optimistic view of birth-rates can give a significant underestimation of the old-age dependency ratio [5].

With a larger population of seniors, it is reasonable to believe that they will contribute even more in society, but also that demands for healthcare and social care will increase. According to a report from the European Commission, healthcare spending will increase by 25%[6] between years 2004 and, 2050 and, with fewer people at working age, this implies significantly greater demands per capita and an increase in the old-age dependency ratio.
There is ongoing discussion about how this development will affect the relation and volume of healthy years and years with disability, dependency or poor health. Fries presents a scenario of how development will continue[7] – labelled “compression of morbidity” – which assumes that the population will become older and that the relation between healthy and unhealthy years will change in favour of the healthy. The underlying theory is that technical and medical improvements combined with positive lifestyle changes can enable this development.

A more negative scenario is “expansion of morbidity”, where the population will become older, but the gained years will only contribute to the number of unhealthy ones and the healthy years will remain unchanged[8]. In reality, neither of these scenarios will dominate, and it is more likely that a combination of them will occur.

We cannot know exactly how the future will pan out, however efforts can be made both to increase life span and to increase the number of healthy life-years. Both efforts to change with a pathogenic and a salutogenic point of departure may have considerable impact. Research has shown that the number of seniors suffering from dementia is increasing with age[9-11], with more than 5.3 million seniors within the EU currently diagnosed with the condition[12]. This figure is expected to double in 20 years. A cure or treatment to postpone this disease will have a major impact on the quality of life and life-span of seniors, as well as societal costs. It has also been shown that an active life – both physically and socially – can protect against dementia[13]. This result is promising, and can be regarded as an example of the potential of salutogenic interventions with regard to quality of life and societal costs.

Preventive Home Visits

One strategy to promote the well-being of seniors is Preventive Home Visits (PHVs). Research about PHVs began in Denmark in the mid-1980s. The Rødovre project showed that visits in seniors’ own homes both reduced the need for hospital care and postponed the need to move to nursing homes[14]. These results have been used as important evidence in a number of subsequent studies[15, 16]. Some research indicates that PHVs or similar strategies can delay the development of disabilities amongst seniors, reduce the need for sheltered homes, or improve quality of life[14, 15, 17-19], whilst some also suggest that PHVs can improve collaboration between general practitioners and other health professionals[20]. A recent literature review suggests that PHVs “favourably affect health and functional status, mortality rates, use of hospitalization and nursing homes, and costs”[21], whilst a systematic review and meta-analysis concludes that “Complex interventions can help elderly people to live safely and independently, and could be tailored to meet individuals’ needs and preferences.”[22]. It has also been suggested that educational intervention for primary care professionals can improve the quality of PHVs, and that education of home-visitors and general practitioners can prevent functional decline for older women in particular[23, 24], and have beneficial effects on feelings of tiredness amongst 80-year-old seniors[25]. This is of importance since older people who feel tired are at higher risk of becoming disabled than others[26]. Some research suggests that PHVs are more effective among younger seniors, however[15] this positive evidence has not been unchallenged. It has been suggested that if PHVs are offered to a general population of seniors, they will not have any positive effects, but may have some impact if the visits are restricted to those seniors who are already frail[27]. Others
INTRODUCTION

conclude that PHVs or similar multidimensional programmes have no effect [16, 28, 29]. A report published in 2004, concluded that PHVs may have positive effects, however the authors recommended that policy-makers refrain from adopting the strategy until substantial improvements had been made in how PHVs were conducted[30]. Some authors have highlighted the lack of comparability between trials, because they have been conducted in different contexts, with different target groups and different healthcare professionals[16]. Some authors also question the use of Randomised Control Trials (RCTs) in this kind of intervention[31].

PHVs began in Sweden in 1998 following allocation of resources by the government. Initially, 22 municipalities/county councils were included and started with different PHV projects. The overall aim of the programme was to gather knowledge about how to promote health and to reduce the need for healthcare among seniors. Within the different municipalities, the seniors received different preventive interventions that had been decided locally. Some decided to implement interventions that were very similar to Danish home visits originally designed for the Rødovre project, and many of these Swedish projects have since been called upon as successful examples of how to improve quality of life among seniors. Aside from the articles in this thesis, only one of these projects has been published as a scientific article[32].

The Realist synthesis – A key to the “black box”?

Interventions such as preventive home visits begin within specific contexts with different actors. Pearson et al. refer to the “black box” in community interventions as something that can “describe phenomena which cannot be directly viewed or measured” [33].

Figure 1. The black box hides relevant information for understanding PHVs.

Within the “black box of PHVs” there are several components, many of which are not addressed in the analysis of PHVs in Nordmaling. Some relate to emotional dimensions (Fig. 1).

Feelings are important, and function as a link between PHVs and what the strategy tries to attain. Maria Emmelin’s quotation – “One has to feel good, joyful and proud to even think about change”[34]
— seems appropriate for old people and PHV interventions as well. Everything that can be found in the black box hides mechanisms that result in concrete and measurable outcomes such as mortality and healthcare utilisation. This problem increases with time as new components enter the box and dilute understanding of the results[35]. In order to address the many components in the PHV black box, as well as other results, I use Ray Pawson’s realist synthesis methodology[1].

A substantive part of the discussion in this thesis has been structured according to the realist synthesis methodology, as it is a method suitable for complex interventions such as PHVs and aims to provide evidence for policy-makers working from a societal perspective. As previously described, there is ongoing discussion as to whether, and under which circumstances, PHVs will work and realist synthesis is a tool that can contribute to this discussion.

All research must seek to contribute to knowledge. If this knowledge is not useful in building society, then it has limited value. It is important, therefore, to use methodologies that are well structured, such as realist synthesis, and can speak to policy-makers. Realist synthesis starts by drafting a theory, to track all relevant background information and to assess what data is good enough. The next step is to scrutinise all data and, with that as the point of departure, to refine the drafted theory. Realist synthesis ends with the challenge to communicate the results.

It is possible to include knowledge, not only generated through randomised controlled trials but also interviews, reports and all other “grey” material, as part of a realist synthesis approach. A single trial cannot tell the whole story; for this we may need repeated efforts, changed perspective, different methods and many contexts. It is important to ask, however, whether this knowledge holds more truth because that same thing is repeated, or shows different perspectives of the same thing, or whether two methods interacting with each other strengthen evidence of causality. According to Pawson, the answer to each of these questions is no [1].

The conventional impulse to prove causation by gathering data on regularities, repeated occurrences, is therefore misguided: at the best these might suggest where to look for candidates for causal mechanisms. What causes something to happen has nothing to do with the number of times we observe it happening [36].

In many systematic reviews, literature reviews and meta-analyses in the field of home visits, PHVs or annual in-home comprehensive geriatric assessments, researchers have attempted to identify outcome regularities and provide advice to decision-makers and practitioners. Often, these reviews and analyses have called for more knowledge and more research. I argue that these results can be products of simplifications and generalisations.

Efforts are made to find outcome regularities and give advice to decision-makers and practitioners. But the presented regularities might as well be confusing or misleading, as accurate and truthful. According to Pawson “We need to understand outcome patterns rather than seek outcome regularities”.

Senior production in Health Economics

The age of a person is important, not least in health economics. The most common health economic analyses today are those of cost-effectiveness and cost-utility. They combine measurements
of health gained and resources used, and arrive at a cost per health unit gained. The health gains are often measured as Quality Adjusted Life Years (QALY), Disability Adjusted Life Years (DALY) or Years Lived Saved (YLS). The goal is to maximise the health gains, with the smallest costs possible.

The impact of age in health economic research needs to be better understood. It is evident that health gains, measured as saved life-years, are significantly greater in younger populations than older ones if the effect of a treatment is long lasting. If the outcome only lasts for a short period, age does not affect the total health gain. It seems reasonable to conclude that the choice of "time-window" has a great impact[37].

A societal perspective is often preferred in health economics, even if decision-makers who want to use the results also need more limited perspectives, for example a healthcare perspective. A societal perspective means that all relevant costs and outcomes should be included, independent to whom they accrue, where they arise or when they build up. The accepted terminology is to divide costs into those that are direct and indirect. Direct costs can be both medical and non-medical, but they must be directly related to the intervention under study. Indirect costs or savings refer to production changes for the patients and/or their families, usually measured as the gross wage[38]. This is the preferred method used by the Swedish Dental and Pharmaceutical Benefits Agency (TLV), for example, when pharmaceutical companies have a drug that they want to be included in the governmental benefit system[39].

If we consider how this "gross wage" measurement will contribute to a standard cost-effectiveness analysis, the problem of age becomes obvious. In developed countries most people enter the labour market at age 20-25 years and retire around age 60-65 years. During this working period illness causes a production loss, and if an individual can return to work quickly then production can resume. In Figure 2 the light triangle represents possible gains following treatment, and should therefore be included in a cost-effectiveness analysis. If people remain healthy or can return to work quickly after illness, production will be greater. Societal perspective takes this consequence into account, meaning that the cost of treatment is balanced by increased production capacity, often measured as the individual's gross income plus employer-paid benefits.

*Figure 2. The production value measured as gross-wage. The light triangle represents illnesses that will result in reduced production capacity.*
When a senior aged over 65 years is suffering from the same disease and receiving the same treatment as someone younger and all other circumstances are identical, no loss in production caused by the disease can be counted, as it is assumed that the senior would not be productive without the disease.

So if seniors remain healthy or quickly return to health after illness, production will not be affected, since the elderly do not produce “anything valuable”. Economic analysis using a societal perspective is based on this assumption, which means that cost of treatment cannot be balanced by increased production capacity.

It is obvious that this view discriminates against seniors, as well as against women, disabled individuals and others who generally have a lower income. Nevertheless, this theoretical standpoint is recommended by many economists[38].

It is arguably unfair to regard production as non-existent amongst older target groups under study when it is included in other age groups. Older people make real contributions to society, and the fact that we do not usually include this unpaid production in economic analysis does not make it any less important.

Including senior production (taking care of grandchildren, informal work in associations etc.) can make a difference in health-economic analyses. The concept of senior production can also be viewed from a gender perspective; a large part of this production is carried out by women, since they live longer and take greater responsibility for the care of spouses and children.

Health economic analysis and realist synthesis have one thing in common, namely, that they are both considered to be a tool or an aid to decision-making, primarily in the public sector. Both methods must be based on public preferences. Resources for healthcare are collected through taxes or insurance premiums, and they should, especially when referring to taxes, be distributed according to widespread views of fairness. If health economic analyses fail to meet these fairness criteria, or we fail to present realistic evidence-based knowledge, it can be assumed that decision-makers will disregard both.
Aim of this thesis

The overall aim of this thesis is to understand if, how and when PHV are a profitable strategy for promoting health among seniors, and to give suggestions for future development of PHV. The above three questions require a multidisciplinary approach, which includes different methods and perspectives.

Specific aims

- To investigate whether preventive home visits to seniors in Nordmaling by professional healthcare and social workers can postpone mortality, reduce the use of healthcare and improve quality of life.
- To determine how seniors perceive PHV in Nordmaling.
- To conduct cost-effectiveness analyses of the PHV trial in Nordmaling.
- To understand what kind of information about senior activities is necessary and feasible for a proper evaluation of senior production, and to generate ideas about how to collect data.
Research process and methods

The setting – Nordmaling

Nordmaling is a municipality with 7 000 inhabitants situated in the north of Sweden near the coast of the Gulf of Bothnia. It is a rural area with most individuals living in villages with fewer than 500 inhabitants. Originally the community earned income from farming and forestry, however, today; Nordmaling is considered a dormitory suburb to Umeå and Örnsköldsvik, the two major cities in the area. For some time, Nordmaling has had more seniors over 65 and 85 years than the national average and this difference is larger today than it was during the PHV trial (Table 1).

<table>
<thead>
<tr>
<th>Year</th>
<th>65+</th>
<th>85+</th>
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<tr>
<td>Sweden</td>
<td>17.2</td>
<td>2.3</td>
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<tr>
<td>Nordmaling</td>
<td>21.5</td>
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The trial

Preventive home visits were conducted in Nordmaling during 2000 and 2001, however the planning for the trial began much earlier. During 1998 a number of meetings were held between representatives of seniors in Nordmaling, staff at the primary healthcare centre and staff from the elderly unit in the municipality. The aim was to discuss improvements needed in elderly care. PHV were discussed along with numerous other ideas, and a decision was made by the elderly care unit in Nordmaling to seek funding for preventive actions among seniors. When the Swedish government decided to fund a number of elderly care projects[40], planning for the Nordmaling trial had been ongoing for some months. An application for funding a PHV trial was sent in and later approved.

Representatives from local pensioner associations were included in the planning from the beginning. They participated in the steering group, together with staff from the primary healthcare centre, the elderly care unit, the local vicar, and politicians from both the municipality and the county council.

These pensioner representatives also participated in the recruitment interviews for the home visitors and were involved in the final decisions as to who should be appointed. Two home visitors were employed, both of whom had professional skills; one had medical training as a nurse, and the second had training in the social field as a care manager. Both were familiar with activities and associations in Nordmaling, and strongly believed that it was possible to promote health in older populations.
Our aim was to conduct a Randomised Controlled Trial in Nordmaling, which implied that some seniors would receive home visits and others would not. This presented an ethical dilemma that was discussed with seniors in a number of meetings. Approximately 500 seniors participated in these discussions, which resulted in approval of the study design.

At the time there lived 929 seniors aged 75 years or older within Nordmaling. The trial included seniors living independently in their own homes, and excluded those living in nursing homes and those who already received home help. In total, 595 seniors were eligible for the trial. Of this group, those whose birth date was divisible by three were assigned to the intervention (i.e. born on the 3rd, 6th, 9th etc. of any month), which gave 200 seniors. The remaining 395 participants were assigned to the control group. A more detailed description of the selection procedure, including the informed consent, can be found in Paper I, Figure 1.

Each senior within the intervention group was assigned to one of the visitors for the entire trial period. This assignment was done by chance, but we avoided assigning a senior to a home visitor with whom they had any previous relations. The intention was to foster a relationship between the senior and the home-visitor, to enable the senior to discuss difficult and sensitive aspects of their life.

Within the intervention group seniors were visited once every six months, so that over the two-year trial period each senior received four visits. Each visit lasted 1.5 to 3 hours and followed a structured programme. The first visit focused on general information about physical activity, and more specific advice was given according to the senior’s lifestyle habits. This first visit also included a general discussion about risky situations within their own homes, for example, the risk of the seniors falling if they had bad lightening and/or slippy rugs. The second visit followed up on the advice given previously. The home visitors added information about fall prevention, influenza vaccines, and examples of activities in the community suitable for this senior. The third visit focused on healthy food and information about symptoms of diabetes, as well as following up on discussions held during the first two visits. An additional priority for the last visit was to inform the seniors about services for elderly wellbeing provided by the municipality and in primary healthcare. This included home help, housing adaption allowance, transportation services, security alarms and nursing homes provided by the municipality, and services provided by the primary healthcare centre such as accessing the general practitioner, nurse or physiotherapist, and how to get mobility equipment or incontinence aids.

It must be stressed that even if the home visits followed the above structure, the visitors assessed the situation of each individual and acted accordingly. Thus, if a person needed a security alarm or drug regime review, the senior was given information about available solutions that were then followed up. In some situations the home visitor also directed the senior to societal or private companies or institutions, or made medical referrals to healthcare personnel. In exceptional cases the home visitors took charge and acted directly to see to that the senior received adequate help, however this was done rarely, because the intention of the PHV trial was to give seniors the knowledge and strength to act independently.
Two years of home visits

The seniors who received the home visits were defined at the beginning of the study and exposed to the intervention; therefore it is correct to refer to this as a prospective cohort study, even though this label is more often used for study designs where exposure to something can be a cause of a disease. The cohort was followed over a period of two years, during which four home visits were conducted. A questionnaire was completed for each visit, with the home visitor reading the questions and populating the form according to answers given by the senior. The form contained questions about how the seniors managed everyday life with respect to the purchase of food, cooking, washing, cleaning, going to bed, dressing and undressing, using the toilet, and showering. The form also included a number of questions that asked the senior to judge their health condition, in terms of feeling tired, depressed, restless, pain, loneliness, and if they were satisfied with their life. Finally, the questionnaire requested the visitor to judge if the senior needed some kind of assistance or help. During each visit the Timed Up and Go test was also used [41].

The responses to the questionnaire consisted of dichotomised data, such as “cooking; yes/no”, or ordinal scales with alternatives (“very good, good, bad, very bad”) Box 1. Some of the ordinal scales were transformed into an interval scale, simply by assuming equal distances between the answer options. As the study measures two groups on four occasions, Friedmans test is suitable. In order to avoid the effects of internal drop-outs, whereby for whatever reason the seniors do not participate in the whole PHV programme with four visits, all analyses were conducted with seniors who received all four visits.

Comparison with seniors without PHVs

Following the end of the PHV trial, we compared the intervention group with our control group. Data came from several sources, namely: the Swedish National Registry for the mortality analysis data; patient records from the primary healthcare centre to examine the use of different healthcare services (scheduled or emergency
appointments with a general practitioner, influenza vaccination, use of incontinence aids etc.); patient registers made by the county council to follow the utilisation of hospital care; and finally, municipal registers for information on the use of home-help and sheltered living for the elderly. Using the PHV group as a reference, incidence rate ratios for mortality were calculated with a confidence interval (95% CI). Calculations were made both as “intention to treat” (ITT) and as “on treatment” (OT) analyses. The trial period was also compared with a post-trial period beginning in January 2002 and ending in October 2004. Subgroups, based on gender and co-habitation, were also analysed.

Calculations were conducted using data from the primary health centre, municipality, and hospital for the period 2000-2001. In addition, data from the municipality and hospital registry also included the post-trial period.

All calculations regarding different kinds of healthcare services took into consideration the number of deaths in the two groups. This was important as the outcome measurement, i.e. number of visits with the general practitioner, related to the number of years the group of seniors was at risk for a visit. This material is presented in Paper I.

Assessment of cost effectiveness

The cost effectiveness of PHVs is often discussed. Some attempts have been made to address cost effectiveness of health prevention at old age [42, 43], and they tend to indicate that prevention is cost effective. The cost effectiveness of PHVs in particular, has also been considered, with a Danish study [44] focusing on the effectiveness of educating the home visitors and a German study [45] that has yet to publish its final results.

A Cost-Effectiveness Analysis (CEA) from a societal perspective requires the identification of all relevant health effects, as well as the measurement of costs and savings caused by each effect. To conduct the CEA of PHVs in Nordmaling, we used gained life-years as the outcome measure. Records of deaths in both groups from 2000 to 2003 were obtained from the municipality and are part of the national registry. Data were managed as described in the section “Comparison with seniors without PHV”.

Swedish data for age- and sex-specific remaining life-years were obtained from official statistics [46]. We assumed that surviving seniors in Nordmaling had similar remaining life-years as average Swedish seniors in the same age groups, which made it possible to calculate gained life-years after the trial period.

In the CEA we used different assumptions regarding the time period of interest and how costs should be included. In one analysis we followed David Rapanne’s line of thought [47] and assumed that gained life-years are connected to additional elderly care and healthcare in the future, well aware of the ongoing discussion as to whether this is appropriate or not [48]. Using official averages of cost per senior in different age groups for home help, nursing homes and future healthcare, these costs were calculated for our cohort. (For a more detailed description; see Paper II.)

The PHV trial was ongoing for two years and consequently all costs for the intervention occurred only during this period, and could be found in the municipality’s records. Costs/savings for changed use of social services and healthcare were calculated as the consumption of
physical units (days, visits, etc.) multiplied by a standard unit price. This standard price originated from official registers and documents from the municipality and the county council. Independent estimations from five informed professional individuals provided, for example, the average time used for emergency visits in primary healthcare. Costs for increased flu vaccinations were calculated in the first year only, and we assumed that the level of, and the cost for, vaccination continued during the second year. Costs for time spent by the seniors participating in the project and the value and quantification of senior production were not included in any of our models.

All costs for the different years have been expressed in 1999 prices and, in order to take time patterns into consideration, a real discount rate of 3% is used in all main calculations.

The results of the CEA form part of Paper II.

An alternative method for estimating cost-effectiveness is Cost Utility Analysis (CUA), which was developed to address problems with CEA such as context dependent effect measures [38]. Simply put, the CUA is a type of CEA that can be used when quality of life is to be included in the analysis. Furthermore, CUA also makes it possible to compare different actions with different primary outcomes (i.e. prevented cases of different diseases).

In this study we use the information regarding costs and gained life years, presented in the last section about CEA. The additional data needed is information about health-related quality of life that can be transformed into utility weights to calculate Quality Adjusted Life Years (QALY). To do this we used EuroQol 5-dimensions (EQ5D) – a questionnaire based on the assumptions that health-related quality of life is captured by five dimensions (mobility, self-care, usual activity, pain/discomfort, and anxiety/depression) and (to put it simply) can be expressed with a numeral between zero and one, with zero indicating worse possible health and one perfect health.

The EQ5D questionnaire[49] was sent to both the intervention and control group approximately 3 months after the last PHV. It would have been preferable for the questionnaire to be sent out in connection to the final home visit, however this was not possible. Furthermore, the ideal situation would have been to send out the EQ5D twice –, both before and after the PHV trial – but instead we had to assume that the two groups ranked their quality of life in a similar way at the beginning of the trial, due to the random allocation process, and thus, that all differences between the groups after two years were a result of the PHV trial.

Results from the EQ5D questionnaire made it possible to calculate quality weights, which, combined with the mortality data, enabled us to calculate QALYs.

The results from the CUA are presented in Paper II.

Refusal to participate

In all interventions some individuals do not want to participate. Of the 248 seniors originally selected for the trial, 52 persons did not want to participate. Characteristics of the drop-out group compared with the other participants are presented in Paper I. Using great discretion in order to avoid anger or anxiety, telephone interviews were conducted with the drop-out group by staff from the municipality.
Interviews – to gain knowledge

Two years after the PHV trial ended, we decided to conduct qualitative research interviews with some of the 196 seniors from the intervention group. Informants were selected purposively in order to reach seniors who represented the wider intervention group and to include a variation with respect to perceptions of health and degrees of tiredness, and also how they responded to the advice of their home visitor. A more detailed description of the sampling procedure is given in Paper III.

Five seniors were selected for interviews, which all lasted at least 1.5 hours. The aim was to find clues as to how PHVs affected health outcomes. After two years it was difficult for some of the respondents to remember if a task was done by the home visitors or by regular health or social care personnel. The aim changed, therefore, towards obtaining descriptions of the situations in which PHVs had been successful, and to try to determine how seniors perceive PHVs. In addition, we were also interested to find out how the seniors had coped with everyday life since the PHV trial had ended, and to assess if home visiting activities would have made any difference in the interim period.

The interviews were taped and transcribed in order to enable later analysis using Grounded Theory. All interviews were coded, categorised and analysed with help of analytical frames of interest. Glaser and Strauss’ status passage[50] and Lazarus’ theory of coping strategies [51] were used in the selective coding procedure. A more detailed description can be found in Paper III.

Diaries to develop ideas

During the work with the CEA and the CUA it became clear that a traditional view of how to include production gains and losses was not accurate. The value of everything that seniors do, following retirement at age 65, cannot be counted as zero. But how, then, should senior-production be identified, valued, and quantified? The first step to answering this question is to identify possibilities for production within the senior group. Since many seniors do not consider their activities as production, however, this proved to be a challenge.

It was decided to provide diaries to some seniors in Nordmaling in order to record and identify their production. In addition, this information was also to be used in a constructive discussion to develop a questionnaire to capture senior production.

In providing the diaries it seemed fruitful to use key informants to identify seniors who varied according to levels of production. We asked the key informant to provide the names of 7 possible diary keepers, as well as an additional key informant. We stated that the possible informants should fit one of the descriptions of seniors provided in Box 2.

With this stratified purposeful sampling method[52] we expected many types of activities to be revealed. An information letter was sent to 31 seniors recruited as described above. A physiotherapist, who is well acquainted in the area, telephoned each senior and gave additional information regarding the diary study. Eight informants did not want to participate and the remainder gave informed consent. The physiotherapist provided additional information when she delivered the diaries, and also answered questions when she collected them. The participating seniors kept their diaries during a one-week period. The amount of time taken to write the diaries varied. Some used short sentences and made assessments at the end of the day, while others
gave full stories. It was stressed that two activities could run parallel, and that the amount of work they put into writing their diary did not correspond to the amount of senior production.

Having received 23 diaries we started to go through them. We concluded that we had reached saturation point (no new information came with each additional diary) and we therefore ended the data collection.

The information within these diaries regarding different activities was than coded and categorised. This grouping process is similar to the first step in Grounded Theory, namely, the open coding procedure[53].

This process gave us material to construct several "ideal types"[54], by merging together several persons, ideas or characteristics, in order to illustrate the heterogeneity among seniors. The key information is shown in Box 3.

We suggest that one of the valuation methods to be used is social willingness to pay (SWP), as the information that exists in many cases refers to the provision cost (the cost for the municipality to provide home help as one example on the entitlement), and we assume that this cost equals SWP. For private goods and services we suggest market valuation. For activities not included in the entitlement or not exposed to a market, opportunity cost of time seems a reasonable valuation method.

Limitations to a person’s right to shape their daily life will seriously decrease quality of life. This is relevant when valuing an activity, since conventional theories assume a freedom of choice. A possible approach when people are illegitimately forced to act in a particular way is compensation, i.e. a loss of utility could result in possible monetary compensation. However, another approach is to measure the reduced quality of life when the activity is due, in part, to necessity.

Box 2. Descriptions used to select possible diary keepers in order to ensure maximum variation.

- A senior that is a member of voluntarily associations, involving several activities during the week.
- A senior who helps with tasks related to their grandchildren
- A senior fitting the proverb “East, west, home is best; there’s no place like home”
- A senior providing home care for their spouse.
- A senior able to take care of him- or herself, but unable to mange any more.
- A senior helping others with lots of different things
- A hard working senior or couple.

Box 3. Key information for coding.

1. Is the activity performed by free choice or not?
2. What is the aim of the activity?
3. Is it part of the societal entitlement?
Figure 3. A summary of research process and methods. Three data-collection methods on time-axis, together with data collected for the four papers included in this thesis. Data indicated with broken lines refer to modeled outcomes or recalled data for interviews. Data indicated with solid lines are obtained by official registries or the controlled trial.
Results

This section presents the most important results described in the four papers, plus some additional unpublished information. More attention is given to results that have not been published earlier.

Two years of Home visits

The selected seniors were aged 80 years on average, with the oldest being 94 years of age. In total 55% were women. Among the oldest third of participants, men dominated (Table 1). Two-thirds were married. Among all widowed participants, 70% were women, and in the oldest third of those who were widowed, 78% were women.

Table 1. Description of the cohort at baseline with respect to gender and age group, (n).

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Youngest third (75-76y)</th>
<th>Middle third (77-80y)</th>
<th>Oldest third (&gt;81y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>27</td>
<td>22</td>
<td>40</td>
</tr>
<tr>
<td>Women</td>
<td>36</td>
<td>41</td>
<td>30</td>
</tr>
</tbody>
</table>

All seniors lived in their own home whilst participating in the study and most had fairly good health, as illustrated in Table 2a. Almost all managed to use the toilet independently. During the two-year period functional decline was observed, which was more appeared for men than women (Table 2b). Purchasing food, using the toilet and bathing represent a range of different ADL (Activities of Daily Living) and IADL (Instrumental Activities of Daily Living) activities that could be captured in the questionnaire.

Table 2a. Proportion of seniors able to purchase food, use the toilet, and bathe independently during the four home visits.

<table>
<thead>
<tr>
<th>Activity</th>
<th>1st visit</th>
<th>2nd visit</th>
<th>3rd visit</th>
<th>4th visit</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food purchase</td>
<td>75%</td>
<td>75%</td>
<td>70%</td>
<td>68%</td>
<td>p&lt;0.001*</td>
</tr>
<tr>
<td>Use of toilet</td>
<td>99%</td>
<td>97%</td>
<td>93%</td>
<td>87%</td>
<td>p&lt;0.001*</td>
</tr>
<tr>
<td>Bathing</td>
<td>96%</td>
<td>93%</td>
<td>87%</td>
<td>81%</td>
<td>p&lt;0.001*</td>
</tr>
</tbody>
</table>

* Friedmans Test

Table 2b. Gender differences with respect to functional decline during the home visiting programme (% units).

<table>
<thead>
<tr>
<th>Activity</th>
<th>Differences between 1st–4th visit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
</tr>
<tr>
<td>Food purchase</td>
<td>-12%</td>
</tr>
<tr>
<td>Use of toilet</td>
<td>-15%</td>
</tr>
<tr>
<td>Bathing</td>
<td>-16%</td>
</tr>
</tbody>
</table>
The fact that we observed a functional decline for both sexes during the two years is not exceptional. The decline appears to be more rapid among males than females, however the difference is not significant. Controlling for age did not explain this pattern.

The next section in the questionnaire asks the seniors how they rate their own health, plus a number of other self-rated questions (Appendix A). Responses to the question “In your opinion how do you rate your own health?” are given in Box 2. The mean rank differed between 2,58 at the first visit and 2,42 at the final one, which means that health was rated a little better for each visit. The change was not significant according to Friedmans test.

The same pattern was observed when seniors were asked how often they felt anxiety or pain and how their life turned out. When analysed using Friedmans test, they showed significant changes between visits (Fig 4.).

In addition to the seniors’ own rating of different aspects, a more objective measurement was also used, namely, the “Timed Up and Go” test, which measures the ability to walk fast. A person sits in a chair, stands up, walks 10 metres, returns and then sits down. The whole procedure is measured in seconds. During the two-year PHV trial this test was conducted four times, once each visit. The average senior took 12,9 sec. to complete the test the first visit, and the time was reduced for each visit (Fig 5.).

**Comparison with seniors without PHVs**

The intervention group and the control group were similar with respect to age, gender and the proportion having received in-patient healthcare during 1999. The drop-out group, included in the intervention group when conducting analysis with an “intention to treat” (ITT) approach, was a bit younger (presented in Paper I, Table 1.).

Mortality differed between the groups during the trial, measured as an “on-treatment” (OT) analysis (Table 3). The relative risk (IR) for mortality was 2,31 in the control group. Measured as an ITT analysis, the IR was 1,79 (CI 95% 0,94–3,40) (presented in Paper I). Some non-sig-
significant results for mortality during the trial may indicate that female seniors and those living alone are more affected by PHVs. There were no effects after the trial regarding mortality – Paper II, Fig. 2.

Regarding the use of home help provided by the municipality, a significant reduction during the two years after the trial period was observed, as well as during the whole four-year period.

The number of used hospital days was fewer for the intervention group than the control group during the trial period, however this difference did not continue after the trial period (Table 4). Emergency visits at the primary healthcare centre were also fewer amongst the intervention group by the end of the trial. The results regarding emergency visits were significant, independently of using an OT (RR 2,69; CI 95% 1,11 – 6,52) or ITT approach (RR 2,29; CI 95% 1,07-4,87). This was not measured after the trial.

Table 3. Results using an On-Treatment approach

<table>
<thead>
<tr>
<th>Year</th>
<th>n</th>
<th>Risk time (year)</th>
<th>Case</th>
<th>IR/RR</th>
<th>CI (95%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mortality</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention group</td>
<td>2000-2001</td>
<td>196</td>
<td>385</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>Control group</td>
<td>2000-2001</td>
<td>346</td>
<td>666</td>
<td>32</td>
<td>2,31</td>
</tr>
<tr>
<td>Intervention group</td>
<td>2002-2004</td>
<td>188</td>
<td>358</td>
<td>32</td>
<td>1</td>
</tr>
<tr>
<td>Control group</td>
<td>2002-2004</td>
<td>314</td>
<td>613</td>
<td>50</td>
<td>0,91</td>
</tr>
<tr>
<td><strong>Mortality – Living alone</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention group</td>
<td>2000-2001</td>
<td>71</td>
<td>141</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Control group</td>
<td>2000-2001</td>
<td>187</td>
<td>360</td>
<td>16</td>
<td>6,27</td>
</tr>
<tr>
<td><strong>Mortality – Women</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention group</td>
<td>2000-2001</td>
<td>107</td>
<td>213</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Control group</td>
<td>2000-2001</td>
<td>195</td>
<td>377</td>
<td>14</td>
<td>3,95</td>
</tr>
<tr>
<td><strong>Emergency G.P visits</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention group</td>
<td>200110-200112</td>
<td>47</td>
<td>6</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Control group</td>
<td>200110-200112</td>
<td>78</td>
<td>27</td>
<td>2,69</td>
<td></td>
</tr>
<tr>
<td><strong>Use of home help</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention group</td>
<td>2000-2003</td>
<td>196</td>
<td>34</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Control group</td>
<td>2000-2003</td>
<td>347</td>
<td>88</td>
<td>1,61</td>
<td></td>
</tr>
</tbody>
</table>

Table 4. Use of hospital care during the trial and one year after, measured as number of days in bed at hospital.

<table>
<thead>
<tr>
<th>Year</th>
<th>n</th>
<th>Risk time (year)</th>
<th>Days in bed</th>
<th>Relative risk</th>
<th>CI (95%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intervention group</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000-2001</td>
<td>196</td>
<td>358</td>
<td>2048</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2000-2001</td>
<td>346</td>
<td>613</td>
<td>3844</td>
<td>1,09</td>
<td>1,03- 1,15*</td>
</tr>
<tr>
<td>2002</td>
<td>188</td>
<td>179</td>
<td>1163</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td>314</td>
<td>307</td>
<td>1866</td>
<td>0,93</td>
<td>0,67- 1,01</td>
</tr>
</tbody>
</table>

31
Assessing Cost Effectiveness – CEA

Health economic analyses are presented from three different time perspectives and using two different methods, CEA and CUA. Irrespective of the used-time perspective, the costs for managing the project during 2000 and 2001 are the same. Table 5. All results are presented in detail in Paper II.

Table 5. Costs for managing the project 2000-2001 (€).

<table>
<thead>
<tr>
<th>Type of cost</th>
<th>€</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salaries for home visitors</td>
<td>123 000</td>
</tr>
<tr>
<td>Training of home visitors</td>
<td>7 000</td>
</tr>
<tr>
<td>Salaries for administrative staff</td>
<td>6 000</td>
</tr>
<tr>
<td>Material, services, travel expenses</td>
<td>10 000</td>
</tr>
<tr>
<td>Overheads</td>
<td>6 000</td>
</tr>
<tr>
<td>Premises</td>
<td>7 000</td>
</tr>
<tr>
<td>Investments</td>
<td>3 000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>161 000</strong></td>
</tr>
</tbody>
</table>

*There are some small differences between the costs presented in Table 5 and costs presented in Paper II, Table II due to a printing error.

The two-year perspective

If we adopt a two-year perspective, the net cost for the trial was €152 000. If we include statistically non-significant savings in elderly care and hospital care in the calculation, the costs were almost balanced and total a net cost of €8 000.

Mortality decreased during the trial, giving 11 gained life-years. This implies that the cost per gained year is €13 800. If the savings are included, the cost per gained year falls to €700.

The four-year perspective

When extending the time period of interest, the results differ. The costs for the trial remain the same, however we now observe a significant difference in the use of home help between seniors who received PHVs and those in the control group. In total, this resulted in savings of €129 000, increasing to €213 000 if we include non-significant savings.

The 11 “statistical” seniors “who survived due to the intervention” were assumed to live as long as average seniors of the same age in Sweden. It is unreasonable to believe that seniors who received PHVs should all die immediately following the end of the trial. This gave 32 gained life-years during 2000-2003.

We used official figures of healthcare and long-term care costs for an average senior in that age group to calculate future costs for our intervention group. This gave a cost of €117 000, thus the ratios (net costs) for this period per life-year gained was €3 700.

The life-time perspective

When adopting a life-time perspective we did not have any data that indicated additional savings due to the intervention, and therefore assumed that there were no such savings. Following the same assumptions as the four-year perspective, it was possible to calculate that 92 additional life-years would be gained.
RESULTS

With respect to future costs for health- and long-term care, the same modelling was performed as for the four-year perspective. The final result was that the PHV trial in Nordmaling gained money when not including future costs for health- or long-term care, and, if this future consumption was included, the cost was €891,000 or €9,800 per gained life-year.

Assessing Cost Effectiveness – CUA

The results of the CUA are also presented in Paper II and are an extension of the CEA results, taking health quality into consideration. The EQ 5D questionnaires provided a quality weight of 0.7 for seniors in Nordmaling within both the intervention and the control groups. This was then used to estimate QALYs instead of gained life-years, and gave the following results for the three time perspectives used in the CEA: 8 QALYs, 22 QALYs, and 63 QALYs. When relating these gained QALYs to the costs, the most expensive scenario was the two-year perspective including only significant results, which gave a ratio equal to €20,100. As in the CEA analysis, when using the life-time perspective the result showed profits, if not including health- and elderly care during added life-years.

Interviews – to gain knowledge

The results from the interview study are presented in Paper III. The model showed that seniors with a low degree of control over their daily life appeared to gain more from PHVs than other seniors.

To varying degrees, getting older implies changes in roles, expectations and opportunities that have an impact on everyday life. This transition is influenced by the home visitor, and can result in a greater influence if the home visitors understand the coping strategies used by the seniors.

Among our informants four coping strategies were identified: “flight instead of fight”, “blaming others”, “social and local bonding” and “rational planning”. These coping strategies are connected with various degrees of activity; some strategies, such as “rational planning”, are characterised as active and involve a high degree of control, and others, such as “flight instead of fight”, can be labeled as passive and involve a low degree of control.

PHVs contribute to positive health development through the promotion of increased activity that can improve seniors’ sense of control over their everyday lives.

Diaries developed ideas

23 seniors participated in the diary study out of 31 who were originally recruited, and ranged in age from 65 to 88 years old (Box 4). Most of those who refused were married, meaning that three-quarters of the respondents were living alone. 12 respondents were educated to primary level and 3 to secondary level, whilst the remaining 8 had higher education. 11 seniors lived in the main village of Nordmaling, with the rest living in the surrounding smaller villages.

All activities were categorised and grouped with regard to the three key questions important in valuing senior production (Box 2). We identified seven aims for the various activities (Box 5). Some activities were part of societal entitlement, some were done by free choice and others were obligatory.
Comprehensive results are presented in Paper IV.

Eight “ideal types” were identified, and the information from the diaries will enable the construction of a questionnaire to identify and assess the monetary value of senior production.

The first lesson learned from this pilot study is that it is important to have tools for the inclusion of senior production, which can be valued either on an input side as the opportunity cost of time, or on an output side based on the replacement cost. Societal entitlements are important in order to make a reasonable choice between these principally different methods. An explicit description of the content of the entitlement is needed to justify the choice of valuation method for each activity. If the entitlement is present, it is logical to value the output; in other words, to estimate society’s willingness to pay (SWP) for the activity. For example, if the societal entitlement includes assistance for seniors to wash their hair, as is the case in Sweden, the output cost (cost for society to offer the service) should be considered. If the senior needs assistance to go to the pub every afternoon, there is no societal entitlement and therefore the opportunity cost should be used.

The second lesson learned is that questions addressing senior production must be adjusted to the type of production being evaluated. In order to obtain a full understanding, the degree of free choice to conduct an activity as well as data describing health related quality of life are important.

**Box 4. Respondents by age and sex.**

65 year, M  
66 year, F  
67 year, F  
67 year, M  
69 year, F  
70 year, F  
70 year, M  
71 year, F  
72 year, F  
73 year, F  
74 year, F  
74 year, M  
76 year, F  
76 year, M  
79 year, M  
79 year, F  
79 year, F  
80 year, F  
83 year, M  
83 year, F  
83 year, M  
87 year, M  
88 year, M

**Box 5. Aims of senior activities.**

1. Informal healthcare  
2. Decent survival  
3. Mutual support between friends  
4. Support within extended family  
5. Income  
6. Charity  
7. Own satisfaction
Discussion

An ageing population is in many ways a sign of societal development. Better education, food and health services are all pieces in the puzzle of successful ageing. Nevertheless, ageing means functional decline, impaired biological functions and cognitive reduction. Preventive home visits cannot change fundamental biological processes, nor is it the goal. Normally an intervention for seniors is regarded as successful if physical and mental capacities are maintained over a period of time. This section discusses general outcomes of PHVs and more specific results of the trial in Nordmaling, all in line with a realist synthesis approach. But first we must consider some, mainly methodological, strengths and weaknesses of the work conducted in Nordmaling.

Two years of PHVs

The results in Table 2a illustrate what can be expected when seniors become two years older, namely, functional decline. It is surprising, however, that this decline is not mirrored in how the seniors rate their own health. The seniors’ self-rated health, with regard to feelings of fatigue, anxiety and pain, indicate fewer problems. Yet this could be an effect of the informants’ willingness to please the home visitor, or perhaps that the targeted seniors felt that they were being specially treated, and therefore answered the self-rated questions in a more positive way than they would in another situation.

One challenge to this argument, however, is that we observed improved results when conducting the “Timed Up & Go”-test, a measurement that depends neither on self-rating or consumption of care.

More women than men participated in the trial, which can be expected due to the longer average life expectancy among women. This may have affected the results, as, in our experience, women tend to follow advice more stringently than men.

The selected intervention group included a greater number of married seniors than a general population would normally include. This may also have affected the results, since married seniors experiencing some form of functional decline can cope better due to support from their spouse. The youngest third of male seniors were more likely to be in the dropout group, and in the oldest third of participants men dominated, which may also have affected the results. Older people are likely to view functional decline as something to be expected during old age, and therefore find it easier to adapt to the situation. This possible selection bias is discussed further in the next section addressing the RCT.

Despite the above considerations, I assess the overall result as promising. If these potential biases are accepted and we conclude that PHVs can maintain stability for the self-rated health of seniors during the trial period, the study must be regarded as a success, particularly when it has been shown that low self-rated health can indicate the onset of disease [34].
Randomised Controlled Trial – “The golden standard”?

The design and analysis of this kind of “real-life” community based intervention is not self-evident. To be able to conduct an RCT in the field of public health is rare. Even if the procedure for grouping the seniors into separate intervention and control groups is random, there are several issues to take into consideration.

All intervention and control seniors live in the same municipality, within a village where the normal pattern is to socialise frequently. Information and knowledge passes easily between the two groups and dissemination cannot be restricted; it is not difficult to imagine that a visit encouraging physical activity to one senior, will easily make a neighbour living next door start exercising.

All seniors and their representatives were invited to information meetings in order to obtain “ethical approval” from all involved. Furthermore, local newspapers found the project interesting, and wrote several articles on it. Irrespective of which group they belonged, most seniors within the municipality were aware of the ongoing PHV trial, and, considering both the neighbour effect and the spread of information, it is a risk that most of the results are underestimated.

To reduce cross-over between the intervention group and the control group, the spouses of all seniors included in the intervention group were also invited to participate. As a consequence, the proportion of married seniors is larger in the intervention group than in the control group. This might have affected the results, since it is assumed that marriage is protective in old age[55] and thus the potential benefits of PHVs are smaller. However, when analysing married and single seniors separately, both groups showed the same pattern of results.

The Hawthorn effect[56], whereby seniors feel that they have been selected for positive reasons and therefore achieve better results, may be one explanation here. However, we did seek to create this Hawthorne effect, not as an explanation for the results but as a part of the intervention itself, as we believed it to be beneficial for the participants to feel that they were appreciated and that their health could potentially improve, in order for the trial to be a success.

One positive effect of the trial is the improvement in the working conditions at the primary health center, following a substantial reduction in emergency visits with the general practitioner. With fewer emergency visits, it is easier to plan normal activities and the workload can be evenly distributed.

The reduction in the use of home help has had a pronounced effect on costs within the municipality. However this may also represent a potential problem. An uneven distribution of the savings between the municipality and the primary health centre gives municipalities stronger incentives to continue with the activity. But, as I will discuss later, a prerequisite of good results is that both managerial authorities participate.

The effect on mortality seemed to vanish when the PHV trial ended. It could be argued that this is the result of unrevealed selection bias; however we have not been able to find any such evidence. Instead, it is more plausible that PHVs do not have any long lasting effects on mortality.

The fact that functional decline was observed for both sexes during the two-year trial is not surprising. Reduction in functionality is more rapid among men, and some could argue that this is an effect of skewed age distribution. However, I did not find a more marked decline among the oldest third of men. The willingness of females to take advice from the home visitors may play a part here. Studies where gender differences are underlined support this hypothesis[23].
The Cost Effectiveness and Cost Utility studies

The results of the health economic analyses can be discussed with regard to several issues. Firstly, the mortality results were based on the OT-approach. The gained life-years and QALYs were significant and therefore approached from a pragmatic standpoint, in that those who refused to participate were excluded from the intervention group. When using an ITT approach, on the other hand, the drop-out group must remain part of the intervention group. For the PHV trial in Nordmaling, this implies that the gained life-years, and later the gained QALYs, were not based on significant results and therefore should be omitted.

I agree with many of the arguments for using an ITT approach when analysing drug tests, for example, however this study must be viewed in the light of an important difference in philosophy between the pathogenic and salutogenic\[57\] perspective (Box 6). People suffering from a disease need, and are entitled to, treatment. People with hypertension need specific drugs in order to reduce the risk of stroke and myocardial infarction, which is an example of an intervention designed from a pathogenic perspective. When assessing a drug, the target group is those with high blood pressure, and the capacity of the drug to lower blood pressure is important, as are adverse effects and the patients’ compliance. In this case, it is a serious drawback if many drop out from the treatment, and if people do not comply because of adverse effects, then the drug is not particularly useful.

People who are offered salutogenic interventions such as in this PHV trial are not targeted because they suffer the same illness; they are targeted because they live in a certain geographical area, are independent and over 75 years of age. They do not need the intervention in the same sense that ill people need treatment. Instead, the offered intervention (PHVs) should be thought of as an opportunity for seniors to gain knowledge, to become inspired or to have social interaction. Those who do not need to take advantage of this opportunity will refuse to participate, while those receiving enough benefits from the trial will continue to participate. A desire to gain knowledge can be considered a tool for selecting the sub-group that fits this particular variant of health promotion, in the same way that illness is an indicator for selecting participants for a drug test. The optimal health promotion programme is able to match different activities with different people, so that all find activities and levels in accordance with their preferences.

Most health promotion activities do not have improved health as a single goal. Physical activity is also fun, food is also tasty and PHVs may also be considered a tool to get assistance in the future if a need arises. These benefits, besides health, are necessary incentives for creating sustainable habits and a willingness to participate in the physical activities or PHVs. Using an eco-

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**Box 6 The...**

--- *salutogenic approach.*

Introduced by Aaron Antonovsky in 1979, this approach enables individuals and organisations to support human health and well-being by strengthen positive recourses.

--- *pathogenic approach*

This is the antithesis of the salutogenic approach, and enables individuals and organisations to support human health and well-being by treating diseases.
nomic framework, one would say that they are necessary for balancing the sometimes high opportunity cost of time.

Accepting this perspective means that analysis based on OT gives valuable information to show the effects and cost in the subgroup that has preferences for a certain promotional activity. Consequently, to cancel an activity that is found to be ineffective based on ITT analysis but effective based on OT analysis, unnecessarily limits the opportunities for promoting health.

In addition, when analysing the mortality for the intervention, control and drop-out groups as three separate categories, the outcome was similar for the drop-out and control group and lower for the PHV group. This seems reasonable since the drop-out group had not been exposed to the intervention. Contrary to this, one study in a Danish context indicates that mortality and nursing home admissions were higher among drop-outs [58].

We should also consider the normative question as to whether additional medical and non-medical costs incurred during gained life-years should be included in our analysis. It is undisputed that a life-saving intervention will draw on resources during added life years, and some argue that this makes it necessary to include future costs in order to give a complete picture despite the additional work required [47].

There are no clear recommendations within Sweden regarding the inclusion of costs incurred during life-years gained, therefore some authors include these costs in cost effectiveness analysis while others do not. The Swedish Health Care Act, including its preparatory works, does not consider life-years gained or quality-adjusted life-years gained to be in conflict with the principles of human dignity and need. However, some researchers claim that they do conflict, even if they also state that one principle does not necessarily have to be chosen before the other [59].

Taking purely financial aspects into consideration, it is easy sympathise with the argument to include future medical costs. The best solution to this dilemma is to present both alternatives; one including future medical costs and one without.

Another normative question is what time perspective to adopt, as several arguments apply. One view is that pain and suffering has a time dimension: the longer pain lasts, the worse it is. Imagine a chronic disease that can begin either during childhood or at old age. The consequences are identical for the child and adult, aside from the age at onset, however many people would judge the condition to be more severe for the child, as the duration of pain is longer. A measure without a time dimension would naturally be unfair for the young. On the other hand, a measure lacking any scale of severity would be unfair to those with serious illnesses. Since serious conditions are more common amongst older people, one can argue that it is unfair to these individuals to exclude the dimension of severity. Relating costs to gained QALYs is one way of taking severity into account. Provided that treatment is successful, a severe condition will result in greater gains in quality of life than a minor problem.

This presents an ethical dilemma when considering the context of older people. It is possible to defend the use of a time-dependent measure convincingly, but also to criticise its use credibly. A possible compromise is to use a “time window”, as done in the evaluation of the PHV trial in Nordmaling. The follow up time is then reduced from life-long to, two, four or five year periods. Within this time window, all costs except production gained are included in analysis, as well as life-years gained. After the window, nothing is counted.
This idea is similar to “discounting”, an established technique within economics used to scale down the weight of events and costs in the future. A time window can be more radical, in that all events up to our five year cut off point have full and equal weight, while all subsequent events have zero weight.

Presentation of a life-time perspective as well as two- and four-year perspectives may be beyond the scope of many studies. However a compromise would be to use the life-time perspective complemented with a 5-year perspective, and then provide all information to the decision-makers responsible for budget allocation.

The Interview study
Interviews were conducted two years after the PHV programme had ended. Significant life changes had occurred for all informants during the two years without PHVs. One had taken off the position of caretaker for their row of houses, one was widowed, one suffered a stroke, another a hip fracture, and one experienced physical deterioration due to general pain and knee-problems. It was evident to us as interviewers that ongoing home visits would have contributed significantly to the informants’ quality of life during this period. For many informants it seemed that four visits were not enough and that they should have continued.

All respondents stated that the PHVs were good and that they enjoyed the visits. However, they also thought that they did not need the visits at the time and that they took place too soon, which is important with regard to the discussion about when the visiting programme should start. Is the best age 75 years old or is it earlier or later? Our informants varied between 79 years and 85 years old at the time of the follow-up interviews, which implies that the visits started at 75 years to 81 years.

This information put the question of “When to start?” into focus. The seniors did not provide a good answer to this question. A starting point at 75 years can be regarded as neither too early nor too late, is it more a question of choice. In our experiences, however, it seems that older age involves more serious life changes that home visitors may be able to play an active part in.

One of the aims of the interview study was to understand the situations in which PHVs are successful, and to determine how seniors perceive this particular intervention. In addition, we were also interested in how the seniors coped with everyday life since the PHV trial ended. It was evident to us that the home visitors needed great personal and professional skills to fulfil the task of actively contributing to the identified life events.

One hypothesis could be that an early starting point – say 75 years old – could have a longer lasting promotional effect for a small number of seniors and that a starting point of 80 years would affect a larger number of seniors for a shorter time.

The final model showed that seniors with a low degree of control over their daily life appeared to gain more from PHVs than other seniors. This result in itself does not tell us if those who gain are younger or older, however, one reasonable interpretation, based on the fact that older seniors tend to be more dependent and thus have a lower degree of control, is that older seniors more often belong to those who gain more from PHVs. Older seniors also experience significant life events more often than younger seniors.
To help seniors increase control seems essential if they are to lead an independent and healthy life. PHVs can contribute to positive health development by improving seniors’ sense of control in their everyday lives and processing the coping strategies used.

It is important that home visitors are well educated so they have a basic understanding of how seniors use coping strategies, and how these affect their health. With good education the home visitors are able to better manage the serious life events of seniors.

**Ideas developed when working with diaries**

Some argue that productivity costs should not be included in cost effectiveness analysis of health interventions. From a human-rights perspective I believe this to be true. However, production gains potentially increase welfare in society and are therefore often included in health economic analyses when the subjects of the study belong to so-called “productive ages”. It became obvious to me when I conducted the cost effectiveness analyses of PHVs in Nordmaling that it is important to develop methods to address senior production.

The diary data made it clear that senior production can differ significantly with respect to intensity, voluntariness, and content. One lesson learned is that a questionnaire addressing senior production must be adjusted to the type of production in focus. When addressing production for which a societal entitlement exists, the important information is what is actually done and how this would have been performed by the community, as the latter, i.e. social willingness to pay, is the basis for the valuation.

Market valuations are used when addressing production for which seniors receive a wage. It can be assumed that the received income is a proxy for the production value.

Senior production such as helping neighbours with shopping, working for the Red Cross or own physical activities can be valued according to opportunity cost. This may be rather low if we compare it with a normal salary, however, and it is indeed a challenge to quantify opportunity costs.

If we take senior production into consideration it will affect cost effectiveness analyses, as well as other important areas. For example, ongoing discussions in Sweden about ages for retirement will be influenced significantly; production gains will be lower than originally believed since current figures for senior production must be subtracted.
Discussion from a realist synthesis perspective

This discussion is an attempt to view PHVs from a realist synthesis perspective[1]. This means scrutinising all weak links, looking at rival explanations, and sometimes going beyond what is politically correct.

The realist synthesis approach is structured as six steps, which helps to illustrate different lines of thinking and should therefore be considered as a tool and never as an obstacle. If the six-step structure restricts your work, it is possible to deviate away from this.

Step 1: To formulate a preliminary theory

The first step of the realist synthesis approach demands broad understanding of the subject in focus, which is needed to formulate a preliminary theory. A theory in the field of PHV could be as follows:

*PHVs provide positive outcomes for seniors over 75 years in terms of quality of life and healthcare utilisation if they are conducted in a professional and structured manner over a continuous period of time, whilst also providing a sense of security and trust in their everyday lives.*

This preliminary theory should be regarded as speculation, and is very close to my own belief at the beginning of my work with PHVs. It assumes that professional contributions are more valuable than lay contributions, and also implies that the visits are more worthwhile if they are conducted repeatedly rather than performed intermittently. The theory also underlines that the structure in itself can be of importance. Finally, the theory states that giving seniors a sense of security and trust in their life will have a positive impact on health and quality of life.

A lot of work must be done to be able to construct this initial theory. One must have a broad understanding of the subject and be able to prioritise between different key concepts. Some of these concepts must be dismissed in order to formulate a theory that is easy to grasp. Some consider PHVs to be fruitful only if the programme involves a large number of visits[15]. Others believe that they are beneficial only if provided to frail seniors[19]. This means that we exclude some evidence from our work in order to be able to prioritise particular research questions based on the preliminary theory.
**The intervention works:**

- if it is conducted by professionals
- and...
- if it is conducted continually
- and...
- if it is conducted with a structure
- and...
- if it gives seniors a sense of security and trust

*Fig 6. The initial theory presented as a chain of theories or a chain of key concepts.*

**Step 2: Track background information**

The second step when using a realist synthesis approach is to identify primary studies that can function as background information, track different programme theories and find empirical studies that can be related to the theories. This is a demanding task, but is an important part of the approach. The initial theory of PHVs may be presented as in Fig 6, with the implication that all links in the chain are important in a realist synthesis approach.

When searching for different programme theories one attempts to identify data that say something about each of the four different parts of the preliminary theory. As an example, both qualitative and quantitative research can be useful to explore the first part of the theory that suggests that professionalism overrides knowledge of laymen. Some studies stress that visits should be conducted by skilled health workers[20], however, to test the theory of that professionalism overrides knowledge of layman not all studies are necessarily in the field of PHVs for seniors. It can be useful to search for studies in other fields that have something to say about professionalism versus the contribution of laymen. For example, a study of how informal activities in childcare contribute to professional work can provide useful knowledge [60]. It is also important to look for material published outside of scientific journals; if the aim is to understand how PHVs function in real life, then lots of interesting and useful information can be found in less academic outlets such as media reports, basic data for decision-making, and other “non-scientific literature” describing PHVs. To include this literature expands the data enormously, however, therefore it is necessary to apply some limitations. There are no specific rules for how this should be done, but the method used will undoubtedly affect the final answers.

Limiting the search to Swedish material is one useful approach if one has a Swedish context in mind. For the present study I searched for material addressing the implementation of PHVs. One source of information is a report by the National Board of Health and Welfare[61], as well as individual reports from each of the 20 PHV projects plus other documents containing information about what happened after the projects had ended. All of this information is useful for two reasons. Firstly, they describe how PHVs work in real life in many different Swedish settings and with methodological variation. Secondly, these reports provide interesting and very useful references. This snow-ball technique can give new information, which is important to be able to explain how PHVs work.
Step 3: What is good enough?
All gathered data must be judged in terms of quality. In steps 1 and 2, no such judgment was made. All documents that addressed the four key concepts included in our drafted theory and passed our exclusion criteria were of interest. To judge quality it is important to remember the aim of the realist synthesis methodology. I want to provide evidence of knowledge about PHVs that is good enough for use by decision-makers. Here “good enough” means that they should be able to decide not only if PHVs should be implemented or not, but also to understand how and why PHVs work.

The reviewer asks ‘is this study good enough to provide some evidence that will contribute to the synthesis?’ and there are two grounds upon which to deliver an answer…[1](p.88)

For the quality appraisal every study has to pass two filters. The first is an assessment of relevance. Can this specific document inform my initial theory in any way? Can it inform one part of my theory presented in Fig 6? One type of study that can be rejected due to irrelevance is those including only frail seniors or patients discharged home from the emergency department[62]. This question is important and indeed relevant, however it is not addressed in the preliminary theory. Other studies addressing some of the four parts of the chain pass the quality assessment despite the fact that the results do not correspond with the formulated theory. These may be studies that indicate that PHVs are of no use[16, 28]. Some data will confirm and other studies will contradict the whole or parts of the initial theory. If different studies contradict each other it is important to look for explanations that can motivate either exclusion or inclusion of the study as a point of departure for reconstruction of the initial theory. If several studies give similar explanations they can be used to refine or focus my initial theory.

It can be even harder to pass the second filter, which assesses the rigour of the original studies. PHVs are a good example of an intervention carried out in different contexts, with different methods and in different populations (Figure 7). This implies that, if you want to understand the mechanisms, the randomised controlled trial is not the “golden standard”. Qualitative trials can be useful and can enable understanding that is not possible through an RCT. A case study might also provide some evidence.

Figure 7. PHV is a strategy used worldwide.
When assessing rigour it is important to look for more than the authors’ final conclusions. It may be that reliable pieces of evidence are hidden in an overestimated final conclusion, and it is important to include this evidence in realist synthesis. Rubenstein and Stuck offer good advice for assessing rigour in an editorial in “Age and Aging”[63] when they questioned the results in a study of Hébert et al. [29].

**Step 4: Scrupulous reading!**

Extraction of data is the next step in the realist synthesis approach. This cannot be done using standardised procedures such as checklists or tables due to the fact that our data; the original reports, articles and studies are all structured differently. All are written for different purposes and have all progressed to this stage of the realist synthesis approach for different purposes.

Extraction of data naturally requires close reading of all documents that have passed thus far. Passages in the documents or important ideas are now grouped together and categorised. There are similarities with the line of thinking in the first steps of grounded theory[53].

This scrutinizing of data revealed that PHVs may work better for older seniors[64] , which may correspond with a hypothesis to strengthen benefits for frail seniors. As a consequence of this, I reversed my earlier decision about the relevance of data relating solely to frail seniors. A result from my own qualitative interview study was that PHVs have the possibility of promoting health by increasing seniors’ level of activity and, through this, improving the sense of control over their everyday lives. This differed from my initial theory where I postulated that it was important to give seniors a sense of security and trust. There is a clear distinction between giving a sense of security (from above), compared with encouraging seniors to take control (from below). The first places the senior in a dependent position, whereas the latter indicates that seniors can make their own choices independently.

This fourth step is not only stage for making annotations. It is also important to stress that all data that have been included thus far have to be described accurately, so that it is possible to judge if and how they fit in the realist synthesis.

> Significant portions of the primary evidence are propelled into the synthesis itself. Synthesis, by realist lights, is all about trying to draw careful inference from evidence and this requires that vital extracts of that evidence have to find their way into the synthesis[1]. p. 92.

**Step 5: Time to refine my theory**

The aim of the fifth step is to synthesise the gathered information. However, one should not try to summarise what has been read or interpret all the data that has been collected. The focus now is to refine my initial theory. For a realist, the task is not to find causal links, but rather to put the enormous puzzle together. All social interventions such as PHVs are complex and must be understood fully to be of help in policy-making.

When gathering synthesised information it is important to remember that the aim is to scrutinise my initial theory, to discover all weak points and problems that may arise when implementing PHVs. The use of only primary studies is a great advantage, as it gives analytic power.
To progress beyond step 5 it is important to look for weaknesses in my theory, particularly if we come across difficulties in the implementation process. It is also important to try to find alternative theories. In the case of PHVs, one alternative theory could be formulated with regard to whom should conduct the visits. In theory, they can be conducted by laymen, [65] however some underline the need for skilled visitors[20] . There are also alternative views when it comes to the other parts of the chain in my theory, for example the frequency and structure of the visits. To date, I have not found any research (except our own interview study) that addresses the final part in the chain, namely, that PHVs give a sense of security to seniors.

Another way to synthesise my collected data is to check if my theory can work in other comparable settings. I have not found any support for different contextual settings being more or less suitable for PHVs, but it seems reasonable that the content should be adjusted to place and culture.

*The goal is to produce a general theory of the conditions that support and hinder the programme theory*[1]. p 95.

The final part of the synthesising procedure is to look for official documents and how they are implemented in practice. This can provide information that needs reformulating, omitting from or adding to my model in order to work in practice. In the case of PHVs, I have examined the official documents in Västerbotten county to search for evidence about the status and success of PHV implementation. The county council has, as have many municipalities, received funding from the Government to conduct PHVs during 2008 and 2009. In the instructions [66] it was stated that:

- PHVs should be offered to seniors over 80 years of age who are living independently;
- PHVs should be planned and offered in collaboration between the county council and the municipalities;
- Both medical, social and informative dimensions should be stressed; and
- PHVs must be conducted regularly and be repeated in order to have positive and long-lasting effects.

A report done on the initiative of the Västerbotten county council[67] adopted most of the instructions from the Ministry of Health and Social Affairs. One exception was that the county council wanted to begin PHVs from age 76 onwards instead of 80 years. Both the Government and county council documents were in line with my initial theory. In addition, the county council decided that all primary healthcare centres should be given resources of 1 000 SEK (€100) per senior as part of the PHV activity.

Politicians in Umeå have ordered an auditor’s report to assess PHV activities in their particular municipality[68]. One of the conclusions from that report is that an annual planning meeting is held between the two management bodies, the local healthcare centre and Umeå kommun. During this meeting all seniors aged 76 years and above are divided between the municipality and the primary healthcare centers. Disappointingly the report does not mention any other activities for improving PHVs, such as the exchange of experiences or education of the visitors.
In an unpublished survey from Västerbotten, home visitors were asked what they regarded to be most important with regard to PHVs. With few exceptions staff from the medical sphere (from primary healthcare centres) stressed health-related goals, while staff from the social sphere (from the municipalities) stressed informative or administrative goals. A further finding was that, on the whole, medically trained home visitors performed home visits to seniors assigned to the primary healthcare centre, while staff trained in social care conducted visits to seniors assigned to the municipality. In at least 5 municipalities no co-operation remains ongoing between primary healthcare centres and elderly care services (2008). A report from the UK Department of Health stressed the value of a team approach with complementary skills[69], as did a study from Australia [20]. Generally, health and social care in Sweden adopts this philosophy in most activities, however, with respect to PHVs there seems to be a managerial divide between primary healthcare and elderly care that significantly limits collaboration. A recent report found that PHVs organised without the involvement of primary health services saw participation levels of only 50%, compared with 80% when primary health service were involved [70].

In the majority of the answers given in the unpublished survey from Västerbotten it is clear that the municipalities offer only one visit. In some cases this is in accordance with the original plan. In other cases the municipalities state that they do not know if PHVs will continue. This uncertainty regarding the future of PHVs will affect the quality of service given, especially as no findings tell us that one visit have any effect.

Together, this indicates that the structure used for successful PHVs in Västerbotten is not in line with what is shown to be needed elsewhere to conduct PHVs with good results. It also means that my initial theory must be revised in order to stress what is important for PHV implementation in real life. This revision must take all information into account in an attempt to formulate a more refined theory that includes every part of the chain of theories (Fig 8.).

The final theory could be as follows:

**PHVs in Sweden give positive outcomes in terms of quality of life and healthcare utilisation for seniors over 75 years if they are:**
- conducted by health workers trained in medical and social care;
- conducted repeatedly in an ongoing programme with a carefully designed structure;
- and increased levels of activity will improve seniors’ sense of control in their everyday lives.

**The intervention works:**

..if conducted by health workers trained in medical and social care
..and..

..if conducted repeatedly in an ongoing programme
..and..

..if conducted with a carefully designed structure
..and..

..when increased activity will improve seniors’ sense of control in everyday life.

*Figure 8. The chain in the final theory.*
Step 6: To communicate my message – the final challenge.

The final step is to disseminate my findings amongst the public, policy-makers, politicians, administrative managers and practitioners.

*Research synthesis needs to be able to locate recommendations in relation to the policy options on the table.*

... choosing an overall analytic theme cannot occur meaningfully in the absence of input from practitioners and policy-makers, because it is their questions and their assumptions about how interventions work that form the focus of analysis.[1]. p. 100.

In our case this implies that we should deliver a model that emphasises and simplifies evaluation and development of the intervention. I cannot communicate a model for a whole family of interventions, which is what PHVs actually are, as they can be delivered in many different ways. Instead, I will give advice for how they may or may not work. It is evident in the Swedish setting that collaboration between the two managing authorities is crucial. That is, both collaboration at a managerial level between the municipality and the county council, as well as collaboration between those employed in long-term care organisations in the municipality and staff from the primary healthcare centres.

The structure of PHVs will probably be inadequate if there is a lack of co-operation or if medical or social components dominate. The main goals will vary significantly between different providers, and thus the actual visits will differ with respect to outcomes. Education of health visitors will vary considerably as well, which means that common training will be of great importance, as well planned activities to enable mutual exchange of experiences between social carers and medical staff. For example, a district nurse may be an excellent home visitor in terms of taking care of patients, but may lack the skills to promote seniors’ health using a salutogenic approach. Equally, a social worker may be skilled in their own area, but may lack training with regard to the health of seniors. However, working together through a mutual exchange of experiences and knowledge, the social worker and district nurse are well equipped to work within a PHV programme.

Despite decisions and recommendations at governmental, regional and local levels, the actual delivery of PHVs in Västerbotten is rarely planned as an ongoing, repeated activity. As there is no evidence for positive health outcomes following a single visit, there is a risk that assumed and desired health effects will not occur.

I have had many opportunities to work with this final step of realist synthesis, namely, communicating results with decision-makers. Two main reactions often occur. The first comes from decision-makers who adopt my main results because they fit their original stand point. If one or several details in my results do not match their view then it is very difficult to have fruitful discussions. I have learned that it is very important in these situations to stress the conflicting part of the results. For example, when decision-makers believe it is possible to see measurable effects after only one visit, I communicate my results by stressing “Today, I will not talk about single-visit programmes”.

The second reaction, which is also very common, is from those who disagree with my optimistic view of possibilities in old age. “How can a low intensity PHV programme give any effects at all?” To answer this question it is important to present research findings that are positive as
well as negative. It is also important to challenge the low intensity view, as in comparison with many other preventive programmes, PHVs are high intensity. A 5-minute discussion with a general practitioner regarding smoking cessation or an advertisement about reduced speed on the roads must both be regarded as small efforts compared with PHVs.

But it is also important for me as a researcher to listen to information from practitioners and policy-makers. To illustrate; when first communicating with practitioners, I often stressed that they should not work so much with questionnaires and brochures. I have now realised that this message was wrong. Co-ordinated work with questionnaires, follow-up structures, evaluation forms and brochures is important to disseminate knowledge between different professionals and the municipality and the primary healthcare unit. This collaboration is essential for success.

The sixth step of realist synthesis is a challenge; however it is vital if a researcher wants their results to make any difference at all.
Final conclusions

PHVs are a suitable strategy to promote health among independent seniors when;

- PHVs are conducted by health workers trained in medical or social care.
- PHVs are conducted repeatedly

Based on my experiences from the PHV trial in Nordmaling, the interview study, diary study and the realist synthesis discussion I wish to stress the following;

- Old age involves serious life changes that may be alleviated or managed with the help of home visitors.
- PHVs must be carried out in collaboration with primary healthcare centres and elderly care services.
- PHVs can encourage and enable seniors to take control over their everyday life.
- PHVs reduce the workload of general practitioners at primary healthcare centres.
- PHVs reduce the utilisation of home help, demand for nursing homes, and hospital care.
- Health economic analysis of PHVs (or other programmes where age makes a difference) should present two alternatives; one with a time-window perspective and one with a life-time perspective.
- Sensitivity analysis should include alternatives with and without future medical costs not related to the intervention.
- An intention to treat approach (ITT) is not ideal when analysing salutogenic interventions such as PHVs.
- There are some basic biological (risk-of-illness), psychological (risk-awareness) and social (lower opportunity-cost-of-time) conditions that distinguish older people from those who are middle-aged. These conditions point towards lower costs and better effects in older groups when public-health interventions are undertaken.
- The societal entitlement is important for evaluating senior production.
Epilogue

I am confident that my work has made a difference, both for seniors, as well as contributing to knowledge that is important for decision-making about preventive actions in old age.

When I started this journey not many seniors in Sweden had enjoyed a preventive home visit. Today, many seniors from all parts of Sweden benefit from them, which is a result that counts. I cannot take the whole credit for this, but I do enjoy the thought that I may have contributed to some extent.

Two successive governments have made favourable decisions to promote the use of PHVs in Sweden. The implication of this is that many municipalities and healthcare centres are now implementing PHVs. My main concern is that many of them conduct activities which they refer to as PHVs, however in reality these differ significantly from PHVs described in this theses. Subsequently there is a great risk that the expected positive health outcome will not occur.

Working with an interdisciplinary approach means that you do not become an expert of either quantitative or qualitative methods, or health economics, but you have some knowledge of different disciplines. This is similar to real life, however, and therefore still has the potential to contribute knowledge. In fact, working in an interdisciplinary manner may improve one’s ability to manage the 6th step of realist synthesis – to communicate results.
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My supervisor Lars Lindholm has also encouraged me during the whole journey, from a new born doctoral student to a graduated PhD. I appreciate his ability to deal with and discuss problems “differently” from another angle. Maybe I have learnt something from that. He has showed me how a good supervisor should act, by being one.

Curt Löfgren must also be addressed. He was the lecturer who initially made me interested in health economics. He has helped me, as some kind of extra supervisor, and is a very good friend. Hans Stenlund helped me with the statistical calculations and good advices.

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Appendix A

HS/Äldreheten/BMH
1999-12-09, reviderat 2002-11-25, English translation 2006-06-26

Preventive Home Visits.

Interview

1. Are you living alone?
   1 □ Yes
   2 □ No

   If yes:
   Since year________

   If no:

   With whom do you cohabit?
   1 □ Spouse
   2 □ Child
   3 □ Sibling
   4 □ Other

2. Do you manage the following activities without help if needed?

   Buying food 1 □ Yes 2 □ No
   Cooking 1 □ Yes 2 □ No
   Laundry 1 □ Yes 2 □ No
   Cleaning 1 □ Yes 2 □ No
   Get up or go to bed 1 □ Yes 2 □ No
   Dress or undress 1 □ Yes 2 □ No
   Use the toilette 1 □ Yes 2 □ No
   Take a bath or shower 1 □ Yes 2 □ No

3. Do you practise any physical activities, e.g. short walks, biking, housework or gardening?

   1 □ Never/hardly ever
   2 □ Less than once a month
   3 □ Once or twice a month
   4 □ Several times a month
5 □ Several times a week
6 □ Daily

4. In your opinion, how is your state of health? Is it...
   1 □ Very good
   2 □ Good
   3 □ Bad
   4 □ Very bad

5. Do you feel fatigued?
   1 □ Hardly ever
   2 □ Sometimes
   3 □ Often
   4 □ Most of the time

6. Do you feel low-spirited?
   1 □ Hardly ever
   2 □ Sometimes
   3 □ Often
   4 □ Most of the time

7. Do you feel uneasiness or anxiety?
   1 □ Hardly ever
   2 □ Sometimes
   3 □ Often
   4 □ Most of the time

8. Do you feel aches or pains?
   1 □ Hardly ever
   2 □ Sometimes
   3 □ Often
   4 □ Most of the time

9. How often do you receive visits?
   1 □ Never/hardly ever
2 □ Once a month
3 □ Once a week
4 □ Daily

10. How often do you visit somebody?
   1 □ Never/hardly ever
   2 □ Once a month
   3 □ Once a week
   4 □ Daily

11. Are you pleased with your life as it turned out?
   1 □ Very pleased
   2 □ Pleased
   3 □ Displeased
   4 □ Very displeased

12. Mobility-Tiredness Scale
    Score____________

13. Timed get up and go
    Score (number of seconds)___________
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