It´s never too late

Health-promotion and disease-prevention for very old persons

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“It is not the years in your life that count, it's the life in your years”

Abraham Lincoln

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ABSTRACT

The overall aim of this thesis was to evaluate the effects of health-promoting and disease-preventive interventions on health and frailty in very old community-dwelling persons, and to explore the participants' experiences in relation to these interventions.

Studies I and II were evaluations of the three-armed randomised, single-blind and controlled trial *Elderly Persons in the Risk Zone,* which consisted of the two health-promoting and disease-preventive interventions preventive home visits (PHV) and multi-professional senior group meetings (senior meetings). A total of 459 persons aged 80 years or older and still living at home were included in the study. Participants were independent in ADL and without overt cognitive impairment. They were assessed at baseline and followed up at one and two years after intervention. An intention-to-treat analysis was performed using the outcome variables; morbidity, symptoms, self-rated health, satisfaction with health **(study I)**, frailty measured as tiredness in daily activities and frailty measured with eight frailty indicators **(study II)**. In **study III,** seventeen participants in the intervention preventive home visits were interviewed in their own homes. The interviews were analysed using a phenomenographic method. In **study IV** focus group methodology was used to interview a total of 20 participants who had participated in the intervention senior meetings. The interviews were analysed according to the focus group method described by Kreuger.

The results of **studies I and II** showed that both interventions postponed morbidity and delayed deterioration in satisfaction with physical and psychological health for up to two years compared to the control group. Both interventions also showed favourable effects in postponing the progression of frailty measured as tiredness in daily activities for up to one year. The intervention senior meetings had an advantage over preventive home visits

since it prevented a decline in general self-rated health for up to one year. However, neither of the interventions was effective in postponing the progression of symptoms or frailty as measured with the sum of frailty indicators. The participants that were defined as frail according to frailty indicators ($\geq$3 indicators) increased in all three study arms during the two-year study period. The interviews with the participants involved in the intervention preventive home visits **(study III)** revealed four categories which explained how they experienced the visit and its consequences for health: the PHV made them visible and proved their human value, it brought a feeling of security and gave the participants an incentive to action. A few of the participants experienced that the PHV was of no value. The focus group interviews with the participants who had received the senior meetings **(study IV)** revealed that the participants lived in the present. However, the supportive environment together with learning a preventive approach contributed to the participants' experiencing the senior meetings as a key to action.

In conclusion, the studies in this thesis show that it is possible to postpone a decline in health outcomes measured as morbidity, self-rated health, satisfaction with health and frailty measured as tiredness in daily activities in older persons at risk of frailty. Both interventions might have functioned as a trigger to motivate the participants to engage in a health-promoting behaviour. The contributing factors were the holistic information, the fact that participants were strengthened in their role as older persons, that someone cared about their health, and the fact that the interventions focused on personal needs. The senior meetings were the most beneficial intervention, which may be due to the group setting where the participants could learn from each other, gain role models and share their problems. Altogether this could have increased participants' understanding and ability to use their own resources and may have motivated them to take measures and engage in health-promoting activities.

Trial registration: NCT0087705.

Keywords: aged, 80 and over, health-promotion, disease-prevention, health, frailty, preventive home visits, group education

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SAMMANFATTNING PÅ SVENSKA

Antalet äldre personer förväntas öka de kommande åren och allt fler uppnår en mycket hög ålder. Sverige är det land i världen som idag har högst andel personer 80 år och äldre (de allra äldsta). Dessa äldre personer beskrivs ofta som en skör grupp, särskilt utsatta för risk att drabbas av sjukdom, nedsatt funktionsförmåga och att förlora förmågan att klara sina dagliga aktiviteter på egen hand. En stor del av dessa äldre upplever dock att de har en god hälsa och lever ett självständigt liv i sina egna hem. Forskning har visat att äldre personer har en stark inre drivkraft att behålla sin hälsa och att det är i första hand de äldre som är oberoende av hjälp från andra som har nytta av förebyggande insatser. Fler insatser borde därför utvecklas för att främja hälsa samt förebygga sjukdom och hos äldre personer som ännu inte blivit sköra.

Äldre Personer i Riskzon var en studie med syfte att utvärdera två hälsofrämjande och sjukdomsförebyggande interventioner till hemmaboende personer 80 år eller äldre som klarade sitt liv självständigt. Studien hade en randomiserad kontrollerad (RCT) samt blind design där personerna slumpmässigt lottades till tre grupper. En grupp fick ett förebyggande hembesök från antingen en sjuksköterska, sjukgymnast, arbetsterapeut eller socialarbetare från kommunen. Syftet med hembesöket var att diskutera den äldres hälsa, levnadsförhållanden och eventuella behov av vård eller tjänster, att informera om tillgängliga resurser och aktiviteter i samhället, samt att stödja den äldre att hålla sig frisk och leva så självständigt som möjligt. Den andra gruppen deltog i fyra seniorträffar med syftet att diskutera och informera om åldrandet och dess konsekvenser för det dagliga livet och verktyg och strategier för att lösa problem som kan uppstå i hemmiljön. Mötena hölls av en sjuksköterska, en sjukgymnast, en arbetsterapeut samt en socialarbetare som var och en var ansvariga för ett tillfälle. Träffarna var av personcentrerad karaktär, vilket innebar att deltagarnas egna behov styrde innehållet i varje träff samt att de byggde på en diskussion där deltagarna var experterna och de olika professionerna fungerade som handledare. Den tredje gruppen var en kontrollgrupp som fick sedvanlig information om tillgängliga resurser i kommunen.

Den första delen av denna avhandling fokuserar på att utvärdera om förebyggande hembesök och/eller seniorträffar kan skjuta upp sjuklighet, symtom, försämring i självskattad hälsa, tillfredsställelse med fysisk och psykisk hälsa och skörhet hos de allra äldsta. Utvärderingen följde 459 deltagare som var 80 år eller äldre, levde i eget boende och klarade sitt liv

självständigt och som inte hade några kognitiva svårigheter. Uppföljningen gjordes i upp till två år efter att interventionerna avslutats **(studie I och II)**. Den andra delen av avhandlingen fokuserar på användarperspektivet av de två interventionerna. I **studie III och IV** har därför deltagarnas upplevelser och uppfattningar av betydelsen av interventionerna utvärderats. Sjutton deltagare i förebyggande hembesöks gruppen intervjuades individuellt och fem fokusgruppsintervjuer hölls med 20 deltagare i seniorträffarna.

Resultatet visade att de som deltog i förebyggande hembesök eller seniorträffar inte försämrades i samma utsträckning i sjuklighet och tillfredställelse med fysisk och psykisk hälsa som kontrollgruppen i upp till två år. Dessutom försämrades deltagarna i mindre utsträckning vad gäller skörhet mätt som trötthet i dagliga aktiviteter jämfört med kontrollgruppen i upp till ett år efter interventionerna. Seniorträffarna var den mest fördelaktiga interventionen eftersom deltagarna försämrades betydligt mindre i generell självskattad hälsa än kontrollgruppen i upp till ett år. Emellertid hade ingen av interventionerna någon tydlig effekt på symtom eller skörhet mätt med åtta skörhetsindikatorer. Vad gäller användarperspektivet upplevde deltagarna i det förebyggande hembesöket att besöket gjorde dem synliga och stärkte människovärdet, medförde en känsla av trygghet samt att besöket gav ett incitament till handling. Några få av de intervjuade personerna upplevde att besöket inte hade haft någon betydelse för dem. Deltagarna i seniorträffarna ansåg att de levde i nuet men att den stödjande miljön som upplevdes i träffarna tillsammans med att de lärde sig ett förebyggande förhållningssätt bidrog till att de upplevde träffarna som en nyckel till förändring.

Sammanfattningsvis visar studierna i denna avhandling att det är möjligt att skjuta upp en försämring i hälsa hos äldre personer vad avser sjuklighet, generell självskattad hälsa, tillfredsställelse med fysisk och psykisk hälsa och skörhet mätt som trötthet i dagliga aktiviteter. Både förebyggande hembesök och seniorträffarna motiverade deltagarna att engagera sig i ett hälsofrämjande beteende. De bidragande faktorerna var den holistiska informationen som förmedlades med hjälp av de olika professionerna och genom gruppinteraktion, att deltagarna stärktes i sin roll som äldre personer, att någon brydde sig om äldre personers hälsa och det faktum att insatserna fokuserade på individuella behov. Seniorträffarna var i denna avhandling den mest fördelaktiga insatsen vilket kan bero på den stödjande miljön som gav deltagarna förebilder, någon att dela problemen med och att deltagarna lärde sig av varandra. Båda interventionerna är värda att satsa på och har potential att bidra till att ett långt liv innehåller så många friska år som möjligt. För att uppnå detta behöver insatser av förebyggande och hälsofrämjande karaktär för äldre utvecklas och integreras i all vård och omsorg för äldre personer.

LIST OF PAPERS

This thesis is based on the following studies, referred to in the text by their Roman numerals I-IV. The papers are reprinted with kind permission from the publishers.

I. Behm, L., Wilhelmson, K., Falk, K., Eklund, K., Ziden, L. & Dahlin-Ivanoff, S. (2014). Positive health outcomes following health-promoting and disease-preventive interventions for independent very old persons: Long-term results of the three-armed RCT Elderly Persons in the Risk Zone. *Archives of Gerontology and Geriatrics*.

II. Behm, L., Ekelund, K., Wilhelmson, K., Zidén, L., Gustafsson, S., Falk, K. & Dahlin-Ivanoff , S. Health-promoting interventions can postpone subjective frailty in very old persons: long term results from the RCT Elderly Persons in the Risk zone. *Submitted*.

III. Behm, L., Dahlin-Ivanoff, S. & Zidén, L. (2013). Preventive home visit and health – experiences among very old people. *BMC Public Health*, 13:378.

IV. Behm, L., Ziden, L., Dunér, A., Falk, K. & Dahlin-Ivanoff, S. (2013). Multi-professional and multi-dimensional group education - a key to action in elderly persons. *Disability and Rehabilitation*, 35(5):427-435.

CONTENT

ABBREVIATIONS

ADL	Activities of Daily Living
CI	Confidence Interval
CIRS-G	Cumulative Illness Rating Scale for Geriatrics
GQL	Göteborg Quality of life Instrument
HBM	Health Belief Model
MCD	Median Change of Deterioration
MRC	Medical Research Council
MMT	Mini Mental Test
OT	Occupational Therapist
OR	Odds Ratio
PT	Physical Therapist
PHV	Preventive Home Visit
RCT	Randomised Controlled Trial
RN	Registered Nurse
SW	Social Worker
TTM	Trans Theoretical Model of change
WHO	World Health Organisation

1 INTRODUCTION

The number of older persons is expected to increase dramatically in the coming years, and an increasing number will survive to a very old age. Actually, Sweden has the oldest population in the world, counting the proportion that has become 80 years or older, which comprises approximately 5 % of the population [1]. These very old persons (80+) are often described as a frail and vulnerable group particularly exposed to disease, functional disability and risk of losing the ability to manage on their own [2, 3]. However, a large proportion of these old persons still live in their own homes, managing most of their daily activities on their own [1]. As it is known that it is the older persons that are independent of help from others who have been shown to benefit most from preventive interventions [4], and that older persons tend to have a strong inner drive to maintain health [5], they should be a suitable group for health-promoting and disease-preventive interventions. Quite a number of such interventions have been developed in recent years, but most of them are of a disease-preventive nature, directed towards persons with specific diagnoses [6]. As no single approach has been found to postpone the complexity of the deterioration in health that comes with advancing age [7], interventions with a multi-dimensional approach need to be developed and evaluated, particularly with respect to those who are at risk of frailty [8].

The public health nurse is well-suited to providing promotive and preventive interventions as she or he has a holistic approach to health and her/his expertise includes health-promotion [9]. However, to meet the complexity of health-promotion and disease-prevention in older persons, diverse health-professionals should work together, bringing a broad spectrum of intervention components [10]. In 2008 a health-promoting and disease-preventive intervention study, *Elderly Persons in the Risk Zone* [11], was set up to evaluate the outcome of a preventive home visit and multi-professional senior group meetings among home-dwelling very old persons. This thesis focuses on evaluating the effects of these interventions, firstly by using a randomised controlled design (RCT) with one- and two-year follow-ups to study the effects on morbidity, symptoms, self-rated health, satisfaction with physical and psychological health and frailty and, secondly, by exploring the user perspective of a preventive home visit and senior meetings by describing the participants' experiences of the interventions.

2 BACKGROUND

2.1 Ageing

Chronological age is used as a measurement of ageing but says nothing about the functional ability of a person, and to some extent chronological age has lost its relevance as a marker of old age. However, human beings are often divided into old or young age, with a line at 65 years. As a group, the persons 65 years and older are heterogeneous, with a large span both in age, gender, health status and education [12]. Therefore old persons are often divided into younger old (65-79) or very old (80 years and older) [13]. In this thesis the very old are named older persons. Ageing is a natural process and involves a complex interplay between biological, physical, psychological, social and spiritual factors. It refers to the process of change that happens over time where some dimensions develop and others decline [12]. The processes that occur over time can be seen as a transition between two relatively stable stages of life. During the transition from one stage in life, status or situation to another, the person experiences changes in his or her external world and his/her perception of it [14]. According to Laslett [15], ageing can be divided into two different stages, the third and fourth age. The third age represents an active period of time after retiring characterised by mental and physical health, and the potential to develop and learn new things. In contrast, the fourth age represents a period of life when a person's functional ability deteriorates, and ailments and diseases lead to dependence on others in activities of daily living (ADL) [16]. This cumulative health–related decline that characterises the fourth age may place a constraint on the potential to experience the positive side of life in older age [17]. Therefore, new skills, new relationships, coping and strategies for handling daily life are required [14].

The consequences of an ageing population have been widely discussed and have generated different theories. One of these theories suggests that the increased life expectancy could mean adding years to the fourth age for many persons, leading to more years with poor health and morbidity [18]. In contrast, the theory of "compression of morbidity" predicts that healthier years are added to life due to improvements in preventive approaches and interventions [19]. A recent study from Sweden concludes, however, that the years added to life among the very old have resulted in an expansion of complex health problems [20]. If this trend continues, it will challenge both health care and the older persons in the future and motivates studies with the

aim to find effective health-promoting and disease-preventing interventions to promote successful ageing. Baltes and Baltes [21] conceptualise ageing as the changing balance between gains and losses, and healthy or successful ageing refers to persons who succeed in achieving a positive balance between these two during this period of life. This includes the ability to minimise losses in function in order to continue to achieve desired goals. According to the older persons themselves, the most common goal of successful ageing is to have good health and functioning [22]. Accordingly, health and function should be obvious targets for the development and evaluation of interventions directed towards older persons.

2.2 Frailty

The large variation in health status among older persons of the same chronological age has led to the development of the concept of "frailty". This concept was first used in 1974 with the aim of identifying signs of the ageing process [23]. Frailty is an aggregate expression of risk of diverse outcomes in older persons and is both a precursor and consequence of a number of geriatric syndromes [24]. The concept provides a tool for planning and implementing interventions with the optimal goal of slowing down the negative consequences of ageing [2].

Although there is no consensus definition of frailty, one common definition is that frailty is “a state of decreased resistance to stressors as a result of cumulative decline across multiple psychological systems” [24]. According to this definition, frailty is a syndrome of progressive physiological decline in multiple organ systems. The syndrome is characterised by loss of function, physiological reserve capacity and increased susceptibility to acute illness, falls, disability, institutionalisation, and death [24, 25]. These changes collectively result in vulnerability to minor stressor events [26] (figure 1, next page).

The above-described definition of frailty includes solely physical aspects, and other more multidimensional definitions have been proposed including both psychological and contextual factors [27].

Two different pathways have been proposed by which a person becomes frail; one is a result of physiological changes of ageing that are not disease-based, and the other is a single or comorbid disease that initiates frailty [24]. Frailty can exist independently of age and disease but is more common in older persons with multi-morbidity [28]. In a recent review [29], it was concluded that 9.9% of the studied persons 65 years or older were frail, while

44.2% were pre-frail. The prevalence increased with age and was more common in women than in men. The reported prevalence of frailty very much depended on the way that frailty was operationalised, with the prevalence being reported as higher if more psychosocial measures were used.

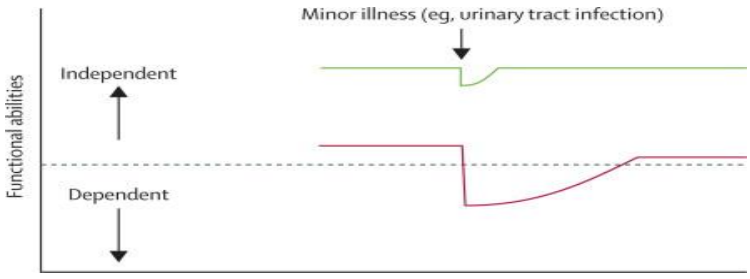


Figure 1. The upper line represents the fit older person who develops an infection and suffers from a small deterioration in function, while the bottom line represents the frail older person who, after the same stressor event, suffers further deterioration, which results in dependence, implying that he/she does not return to his/her previous status[26]. © The Lancet

Similarly to its definition, no consensus has been reached so far on how to operationalise frailty. A number of models have been developed over the years with a focus on two emerging models: 1) the phenotype model [24] and 2) the cumulative deficit model [30]. The phenotype model measures the presence of signs or symptoms, while the cumulative deficit model comprises a checklist of clinical conditions and diseases. A consensus group of gerontology researchers [31] recommends that physical frailty should be measured according to the phenotype model developed by Fried and co-workers [24], which takes into account the presence of three or more of the following criteria: unintentional weight loss, self-reported exhaustion, low energy expenditure, slow gait speed, and weak grip strength. It has been proposed that frailty can be seen as a continuum from robustness to pre-frail to the full syndrome of frailty [32]. The phenotype model describes persons in the pre-frail phase as those having one or two of five frailty indicators [24]. The early stage of frailty has been shown to be common among community-dwelling older persons [33], while the later stages are common among persons living in nursing homes [24]. Persons in a pre-frail phase can either become frail or be restored to the non-frail phase. However, the transition to higher stages of frailty is more common than transition to stages of lesser frailty [33]. The signs of the earlier stages of frailty may be unnoticed, and an alternative way of measuring frailty is to measure a sign that can be experienced by the older persons themselves. Such a sign can be tiredness in

daily activities. The instrument Mob-T, which measures tiredness in daily activities, has been tested and validated for the identification of frail older persons, with reference to the relationship between co-morbidity, frailty and disability [34].

Prevention of the progression of frailty could make a great difference both to the older person and to society. Several interventions show that it is possible to postpone a decline in function in older persons [35-38]. Such studies emphasise that the degree of frailty is one of the factors that plays a role in the effectiveness of the interventions, and assumes that the pre-frail stage is the most responsive stage [39, 40]. Thus, to postpone the risk of adverse health in older persons, interventions directed towards persons at risk of frailty (pre-frail), with the aim of postponing the development of frailty and its negative consequences should be developed and evaluated.

2.3 Health

Health has been described in various ways depending on the discipline concerned. There are mainly two directions, the biomedical definition, which only sees health as a state in which disease or illness is absent and the World Health Organisation's (WHO) definition [41], in which health is defined as " a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity" [42]. However, both these definitions become problematic when defining health in older persons who often suffer from multi-morbidity. The conditions of older persons are very complex, often impacting on several mechanisms, and therefore require a holistic approach [43]. The holistic definition includes physical, mental, emotional, social, spiritual and sexual health. This definition also includes the dimensions of society and environment [44]. Nursing science is based on a holistic view of health; it is assumed that human beings are not reducible to separate units but should be considered in a holistic way, meaning that body, mind and spirit are seen to act together [44, 45]. An attempt to have a holistic approach and consider both objective health and how we experience (subjective) health is the model "health cross" developed by Katie Eriksson [46]. In this model the relationship between health and morbidity is seen as two dimensions of health and not each other's opposites. Eriksson's health cross is often interpreted as an illustration of the relationship between illness and disease i.e. between subjective perceived symptoms and a medically diagnosed objective disease. Idler *et al.* [47] reported that only 18% of the variation in perceived health was related to objective health. Thus, to gain a

holistic picture of older persons' health, both subjective and objective measures of health should be used.

Subjective health reflects a person's perception of health, including its biological, psychological and social dimensions, and it is inaccessible to an external observer [48]. According to studies of older persons' health, health is experienced when one is in balance and harmony in everyday life [49, 50]. This occurs when the essential structures of health are balanced; when one is able to master daily life, experience that the body works by itself, is happy and satisfied with one's existence, is validated as a worthy and competent person and is involved [50]. A person's perception of health can be affected by, among other things, morbidity, illness, injury and suffering but also by poverty, unemployment and lack of social relations [51]. The concept of illness refers to the personal experiences and reactions to symptoms or suffering [52]. Many factors are known to influence the experience of symptoms. These factors include demographic variables, for example, age, gender, ethnicity, education and financial status, personal traits and physical character condition, such as health status or diseases [53]. Living longer in most cases means having more symptoms [54] and several common health complaints often occur simultaneously and interact with each other [55]. Symptoms interacting with each other create a vicious circle and one symptom leads to another [56]. This might induce distress and affect the quality of life in older persons [53, 54].

In contrast to self-reported health, chronic diseases and impairments reflect medical dimensions of health, which could be objectively verifiable by an external observer from physical and laboratory examinations and medical records [52]. A disease is seldom or never a consequence of natural ageing, but age is nevertheless the most important risk factor for developing morbidity [57]. The biological ageing process can be divided into primary and secondary aging. Primary ageing refers to the age-changes that happen to all persons regardless of environmental impact, while secondary ageing develops as a result of external and internal factors such as environment and lifestyle, genes and inheritance. Unlike primary ageing, secondary ageing can be prevented or postponed [57, 58].

In summary, as frailty increases with age, the risk of health problems becomes imminent. Many health problems interact with each other, creating a vicious circle where one health problem creates a new one. Health assessments in older persons are thus complex and should be evaluated with a holistic approach to health where both subjective and objective measures are included.

2.4 Health-promotion and disease-prevention for older persons

Health-promotion has been defined by the World Health Organisation (WHO) as "the process of enabling people to increase control over their health and its determinants, and thereby improve their health" [59]. According to Berg and Särvimäki [60] health-promoting nursing is based on a holistic view and focuses on understanding a person's life world in relation to health, diseases and suffering instead of focusing on problems and diagnosis. Health-promoting interventions should therefore be characterised by cooperation, dialogue, empowerment and respect for the person [61], i.e. person-centred principles. To address the complexity of ageing, interventions targeting older persons require diverse professionals to be able to offer a broad spectrum of intervention components. These interventions should include both nursing and rehabilitation [62]. Cross-professional teamwork has been defined as collaboration between professionals from different disciplines working towards a common goal [63]. However, the different professionals most likely have their own way of approaching the problem [10].

Today there are mainly three approaches to health-promotion. The behavioural change approach, the educational approach and the empowerment approach [61]. The behavioural change approach encourages persons to adopt healthy behaviours which in this approach are seen to be the key to improved health. In this view, the person is responsible for his or her own health, and the health-promoters are the educators. Interventions according to this approach may be one-to-one counselling, information or patient education about a specific condition. The educational approach aims to provide knowledge and information without persuading or motivating a change of behaviour. Instead, the increased knowledge is supposed to lead to a change of attitude, which may lead to changed health behavior [64]. The third approach, which is used in the study *Elderly Persons in the Risk Zone*, is the empowerment approach. The concept of empowerment means giving people responsibility and a chance to participate, while the professionals step back, but indicate or inform their clients about alternatives, and encourage them [65]. The definition of health-promotion described by WHO [59] as a process of enabling persons to increase control over their health is very much an empowerment approach in which the health-promoter helps persons to identify their own concerns and acquire skills and confidence to act. In this approach, the health-promoter has the role of a facilitator instead of an expert [66]. Interventions targeting older persons according to an empowerment

approach include a dialogue where the older person gains knowledge about changes that occur in old age and strategies to cope with them. Resources and limitations should be identified inside and outside the older person instead of relying on health care solutions [67].

Although older persons may learn more slowly and often need more practice than younger persons [68], they are able to accomplish similar results to those achieved by young learners given sufficient time and assuming sufficient motivation [69]. Self-care is a key concept in health-promotion and refers to the decisions and actions a person can take to cope with a health problem or to improve his or her health [59]. If information is given about self-care skills, it may be possible to enable older persons to participate more actively in promoting their health [69]. As health-promotion priorities change with age, the focus should be on promoting what is healthy and trying to preserve and strengthen that, the ultimate goal being independence [70].

Disease-prevention refers to those measures taken to reduce morbidity and premature mortality. It is sometimes even called the medical approach to health-promotion. Disease-prevention can be subdivided into primary prevention, secondary prevention and tertiary prevention. Primary prevention refers to actions taken to prevent the disease from developing by risk education, secondary prevention refers to the prevention of the progression of a disease, while tertiary prevention refers to the reduction of further disability or suffering in those persons already diseased [64]. Disease-prevention in older persons should focus on chronic diseases, which are approached most effectively with strategies of postponement instead of cure [19].

In recent years there has been an increase in health-promoting and disease-preventing interventions directed towards older persons. These interventions include both an individual and group based approach. Such interventions include preventive home visits and group education.

Preventive home visits (PHV)

The preventive home visit is a type of intervention that has been frequently used and studied in recent decades. The general aim of the PHV is to gain a picture of the older person's health, living conditions and possible needs regarding care or services, as well as supporting him or her to stay healthy and live as independently as possible. A further aim is to reduce hospital and nursing home admissions and associated costs [11, 71, 72]. Preventive home visits directed towards older persons have been used as a health-promoting intervention for about 30 years, and it is mandatory by law in Denmark, England, Japan and Australia. In Sweden the use of PHV has increased since

1999, when twenty one projects all over Sweden received financial support [73].

Although the PVH is an appealing concept, its benefits have been difficult to prove [7, 74, 75]. Factors such as the inclusion of different age groups and various numbers of visits conducted by different professionals make it difficult to compare and evaluate PHV interventions. In a meta-analysis of PVHs, Huss *et al.* [76] present a set of stringent inclusion criteria, but they found a heterogeneous effect on mortality, nursing home admissions and functional status. In a review of 18 studies on PVHs, Fagerström *et al*. [77] found positive effects on mortality, function, quality of life, subjective health, admittances for care, and increased knowledge on health. On the other hand, other studies on PHVs failed to show any effects [74]. A report from WHO [75] concluded that more systematic studies are needed before deciding whether the intervention PHV can be recommended or not.

Certain criteria have been shown to contribute to the positive effects of PHV. Such criteria are, for instance, the involvement of older persons in an early and reversible phase of poor health or disability [78], an interdisciplinary approach [79, 80] and a large number of visits, which is associated with more positive effects [7]. Danish experiences of PHVs show that if the conversation between the visitor and the visited is structured, more positive effects are seen [81].

Participants who have received a PVH are in general positive to the intervention [72, 77], appreciating for instance, the opportunity to discuss problems with professionals and to receive attention and support [78, 82, 83]. Further, receiving knowledge and facts from a visitor with a professional background had a positive impact on the participants' perceived security and confidence [72]. Discussing the possible impact of PHV, Hendriksen and Vass [84] stress that the persons are taken seriously, and that they are involved in decisions concerning their own health. Furthermore, they believe that being informed about the system may improve the older person's self-image.

In summary, a home visit is a complex social process influenced by numerous factors [85]. This fact, together with the inconsistent results on the benefits of such interventions, motivates further development and evaluations of both the outcomes and the participants' view of the preventive home visit.

Group education

Group education is another model that has been shown to be good for making participants change their risk behaviours [86, 87] and increasing their knowledge and self-efficacy [88, 89]. The discussions that occur in the group setting have been found to be a factor that contributes to the effects of this kind of education [88]. Several advantages are associated with group education as compared to individual tutoring. Group members are able to compare their experiences with other members, learn from each other and give and receive support [90]. The group may also contribute to greater social interaction and making new friends, which is important for good health [90, 91]. In a comparison of group education and individual counselling, it was seen that members of groups gained in self-confidence, while those who received individual counselling felt that they were dependent on care providers' instructions, which limited them in taking responsibility and actively participating in their own promotion regimen [92]. A recent study on diabetes self-management education found that group education was more favourable than individual education in older persons [93]. Peer education where members of the same age group with similar experience learn and share health information and health behaviour with each other is a well-known concept [94]. Fellow participants are often seen as credible sources of information [95, 96], and older persons' wisdom can be used as a tool in the interaction of the group [97]. However, research in the area of group education for older persons is limited and often restricted to specific medical diagnoses or risk factors [98], and no single approach to preventing the complexity of the impairment that comes with advancing age has yet been found [7, 75, 99]. Lorig *et al*. [100] have conducted a self-management programme for chronically ill patients focusing on generic rather than disease-specific skills. The programme showed improvements in health behaviours, self-efficacy and health status. Thus, the benefits of the group setting could be used in health-promotion and disease-prevention focusing on the complexity of ageing. As there is little evidence of the effects of such interventions so far, the outcomes of this kind of intervention need to be studied.

2.5 Health behaviour

A number of theories have been developed in an attempt to understand why persons behave in a certain way and why they make certain decisions about health. These theories can help when interventions targeting health are planned, or when evaluations of health behavior need to be understood. One of those models is the health belief model (HBM), which is a model for

predicting a person's protective health behavior [101]. HBM is derived from psychology and behavioural science, and is based on the theory that whether or not a person changes his or her health behaviour depends on an evaluation of the benefits and feasibility weighed against its costs. HBM describes the following four dimensions that affect health behavior; 1) perceived susceptibility, which is the subjective perception of the risk of obtaining a disease / condition. 2) perceived severity, which is the feeling of how serious it is to have the disease or condition. 3) perceived benefits, which refer to the feeling or belief in the effectiveness of the actions to prevent the disease or condition that threatens and 4) perceived barriers, which refer to the person's perceptions of potential negative aspects of a health action [102]. Lately the dimension "cues to action" was added. HBM describes two types of cues that trigger a person to take action: external cues, which refer to mass media, advice or raised awareness, and internal cues, referring to morbidity or physical symptoms. Self-efficacy [103], or one's confidence in the ability to successfully perform an action, has also been added to help the HBM to better fit the challenges of changing behaviours.

It has been suggested that when people change behaviour they go through a cycle of change. The trans-theoretical model (TTM) [104] concludes that people change their behaviour if they are ready (readiness) to change. TTM claims that people progress through five stages when making any lifestyle changes. The first stage is "Precontemplation" when people are in this stage they do not consider their behavior a problem. This may be because they have not yet experienced any negative consequences of their behaviour, or it may be a result of denial. The second step, which is "Contemplation", means that the person is becoming aware of the benefits of making a behavioural change, is seeing solutions and is planning to take action. Negative effects of behaviour can also push a person in the contemplation stage [104]. In this step, the HBM complement TTM by increasing the understanding of what triggers a person to take action [101]. The third step is "Preparation", where the person has taken some steps in the direction of change and intends to take action. "Action" is the fourth step, and in this stage the person has changed his or her behaviour for less than six months. If the change lasts for more than six months, however, the person has moved to the stage "Maintenance". According to the TTM, persons are usually in different stages of readiness to change any health behaviour, and different types of information and interventions are needed for people who are in different stages [104]. This fact advocates a person-centred approach when developing interventions for older persons, where the participants need to shape the content of the intervention.

2.6 Rationale

The proportion of the population aged 80 years or older has increased worldwide, and the oldest population is to be found in Sweden [1]. The consequences of these demographic changes have been discussed and generated several available theories. Some claim that the older population is becoming healthier [19], while others state that the increased number of older persons will lead to more sick and disabled persons [18]. Studies that have examined the development of health of older persons in Sweden have shown favourable trends in the younger-old [105]. However, a recent study of the very old has shown an increase in complex health problems [106]. This could be a result of the higher survival rate of severely ill persons following improvements in health care and may reflect the emergence of a frail old population. This challenge requires adequate measures to avoid the consequences for both the persons concerned and society. As earlier stages of frailty are assumed to be the most responsive stage for intervention, health-promoting and disease-preventive interventions should be introduced before the older persons reach the frail stage [39, 40]. More and more attention has been paid to studies of this kind in recent decades, and one such invention is the preventive home visit. However, conflicting results have led to a need to develop and further evaluate such interventions [7, 74, 75]. Group education has been shown to be a suitable model for behavioral change and should be especially suitable for older persons as their wisdom and experiences can be used as a tool [97]. Consequently, the emergence of a frail older population points to a growing need to develop interventions that can slow down the decline in health in older persons. The interventions that are currently available need to be further developed and evaluated.

3 AIM

The overall aim of this thesis was to evaluate the effects of health- promoting and disease-preventive interventions on health and frailty in very old community-dwelling persons, and to explore the participants' experiences in relation to these interventions.

The specific aims were:

1. To analyse the long-term effect of the two health-promoting and disease-preventive interventions preventive home visits and multi-professional senior group meetings concerning morbidity, symptoms, self-rated health and satisfaction with health.

2. To evaluate the long-term effect of health-promoting and disease-preventive interventions in independent very old persons with special reference to frailty.

3. To describe the variations in older people´s (80+) experiences of a single preventive home visit and its consequences for health.

4. To evaluate multi-professional senior group meetings by exploring the participants' experiences of the intervention.

4 METHODS

4.1 Design

This thesis is designed to evaluate health-promoting and disease-preventive interventions for community-dwelling very old persons and comprises four studies (table 1). The studies are all parts of the larger intervention study *Elderly persons in the Risk Zone*, which consists of two interventions and a control group. The two interventions both contain several interacting components acting both independently and interdependently and can thus be called complex interventions [107]. According to the British Medical Council's (MRC) framework for evaluating complex interventions, it is necessary to have a mix of evaluation methods both to capture the effects and to gain an understanding of the effects of the interventions [108]. Therefore both quantitative and qualitative data analyses are used in this thesis. The first two studies aimed to evaluate the effects of multi-professional senior group meetings and a preventive home visit using outcomes such as morbidity, symptoms of illness, self-rated health, satisfaction with health (**study I**) and frailty (**study II**). The following two studies aimed to explore very old persons' experiences of multi-professional senior group meetings (**study III**) and a preventive home visit (**study IV**).

Table 1. Overview of the studies included in the thesis

	Study population	Study design	Data collection
Study I	Home-dwelling very old persons at risk of becoming frail (n=459)	RCT	Morbidity, symptoms, self-rated health and satisfaction with physical and psychological health
Study II	Home-dwelling very old persons at risk of becoming frail (n=459)	RCT	Frailty measured with 8 frailty indicators and as tiredness in daily activities
Study III	17 persons from the intervention Preventive Home Visits	Qualitative	Individual interviews
Study IV	20 persons from the intervention Senior Meetings	Qualitative	Focus-group discussions

The intervention study Elderly Persons in the Risk Zone

Elderly Persons in the Risk Zone [11] was a randomised controlled three-armed trial (RCT) that comprised two health-promoting and disease-preventive interventions and a control group. The study addressed community-dwelling very old persons at risk of becoming frail. The RCT was performed in Gothenburg, Sweden between November 2007 and May 2011. The overall aim of the intervention was to postpone the progression of frailty and deterioration in perceived health and quality of life and to minimize the participants' need of medical care. The overall hypothesis of the intervention study was twofold: 1) it is possible to delay deterioration if an intervention is made when the older persons are at risk of becoming frail and 2) a multi-professional group intervention is more effective in delaying deterioration than a single preventive home visit. The two interventions in *Elderly Persons in the Risk Zone* were planned and developed jointly by researchers, experts in the field, representatives from the urban districts and local representatives of organisations for older persons. *Elderly Persons in the Risk Zone* consists of two interventions and one control group, and the participants were randomly assigned to receive:

1). Preventive home visit

2). Multi-professional senior group meetings

3). Control group.

Preventive home visit (PHV)

The intervention preventive home visit consisted of a single home visit made by a registered nurse (RN), an occupational therapist (OT), a physiotherapist (PT) or a qualified social worker (SW). The PHV aimed to establish contact and to discover problems, as well as identifying unmet needs that could be met by the districts or voluntary associations. Also, the aim was to support the older person to stay healthy and live as independently as possible. The home visit was conducted as an individually structured conversation between the older person and the professional person, focusing on the older person's health. During the visit the older person received verbal and written information and advice about what the urban district could provide in the form of local meeting places, activities run by local associations, physical training for seniors, walking groups etc. The older person was also informed about help and support of various kinds offered either by volunteers or by professionals employed by the urban districts, assistive devices, adaptation of housing, fall risks and whom they could contact if they had any medical problems. The preventive home visit was guided by a protocol, which

included an opportunity to further elaborate on certain elements (table 2). The staff was prepared by joint training, and regular staff meetings were held to maintain the quality and standardisation of the PHV. The visit lasted between one and a half to two hours.

Table 2. The elements in the protocol used in the preventive home visit in the study Elderly Persons in the Risk Zone

Protocol Elements
Information and advice about a basic home exercise programme including balance exercises.
Assessment of the fall prevention checklist, information and advice on how to prevent fall risks and to continue to be active.
Information and advice about technical aids and housing modifications
Information and advice about smoking alarms.
Information about the range of help and support available in the urban districts (volunteers, churches, mission fellow human, health centres etc.).
Information on the possibility of an appointment with a pharmacist at the local pharmacy for review of and counselling on medicines
Information and advice about incontinence
Information on the Swedish legislation and possibilities for advice on and assessment of driving capacity by professionals
Information and advice about what the districts provide in the form of local meeting places, activities run by local associations, physical training for seniors, walking groups for seniors, and possibility of receiving or providing volunteer interventions
Offer to register for "try-out" activities.
Information about public transportation, including busses adapted for older adults, and the mobility service for the disabled
Information on the social services act, and on where and whom to contact in the urban districts in order to apply for home care services

Multi-professional senior group meetings (Senior - meetings)

The intervention senior meetings comprised four weekly meetings with up to six participants in each group. The meetings each lasted for approximately 2 hours including a coffee break. The main purpose was to focus on two different topics: 1) information about the ageing process and its consequences and 2) provision of tools and strategies for solving problems that can arise in the home environment. A follow-up home visit took place two to three weeks after the group sessions were completed. The group meetings were multi-professional and multi-dimensional i.e. they were led by a RN, OT, PT and an SW, all of whom were responsible for their particular dimension of ageing. The RN was responsible for the topic of self-care and how to use medication. In this meeting how to take care of your health was discussed. Opening questions were: "What does health mean to you?" and "What do you do to enhance or sustain your health?" The participants discussed what to do in case of emergency, when to call for emergency help, and where to go if

they needed health advice. The OT was responsible for activities in daily living and everyday technology, the PTs topic was to discuss the ageing process, physical activity and nutrition, and the SW was responsible for the topic of quality of life in old age and for discussions about help, support, activities and meeting places offered by the two urban districts. The different professionals' role was to encourage and to guide the participants in the learning process, focused on a health-promoting behavior. As the meeting was based on a discussion, the participants' experiences formed the basis of the meetings. In contrast to traditional education, the professionals' role was to be enablers, while the participants were the experts. The group dynamics was used as a tool to provide an arena for knowledge exchange. A booklet was especially produced for the meetings. It includes texts that cover different areas of health such as self-care strategies and information on the topics that were discussed at each of the meetings (table 3). http://www.vardalinstitutet.net/livslots.pdf.

Table 3. The themes from the booklet used in the intervention senior meetings in the study Elderly Persons in the Risk Zone

Principal professional*	Themes from the booklet
PT	Ageing
PT	Physical activity helps keep you physically fit
PT	Food is a prerequisite for health
RN	You can take care of problems with your health
RN	How to use medicines
OT	To cope with everyday life
OT	You do not need to feel insecure
OT	Technology in everyday life
OT	Will I lose my memory?
SW	Life events and quality of life during ageing
SW	Anyone who needs help can get help

*PT=Physical Therapist, RN=Registered Nurse, OT=Occupational therapist, SW=Social Worker

Control group

The control group had access to the ordinary range of services for older persons in the urban districts if requested. The aim of the urban districts provision of care for older persons is to ensure the ability to live as independently as possible. This includes remaining in their homes. When an older person in Sweden has difficulties managing independently, she or he can apply for assistance from the district. The extent of such support is subject to an assessment of needs and includes meals on wheels, help with cleaning and shopping, assistance with personal care, safety alarms and transportation service. The older persons are also offered healthcare, provided either by home help or home medical care services in the urban district.

Power calculation

A power calculation was conducted before the start of the study. As the outcome measures were not tested for their ability to detect change over time according to the target group, the power calculation was instead based on the expected relative change over time in functional abilities between the study arms, a significance level of alpha = 0.05, and a power of 80% in a two-sided test. The power calculation showed that at least 112 persons were required in each intervention group to be able to detect a difference of at least 15% between the groups, and that a comparison between the control group and the intervention groups would require 72 persons in the control group, assuming a difference of at least 20%. Thus, it was found that at least 300 persons were needed; a total of 459 persons were therefore included to allow for dropouts.

4.2 Participants

The eligible study population for **studies I and II** consisted of older persons 80 years or older, living in two urban districts in Gothenburg, Sweden (n=3906). The two urban districts Härlanda and Örgryte are situated outside the city centre but within the city limits and contain a mix of self-owned houses and apartment blocks. The general educational level and income level of residents were slightly better, and the sickness rate somewhat lower, than in the population of the city of Gothenburg as a whole.

Equal numbers of older persons from the two districts were listed in random order and included in the study until the sample size was reached. An invitation letter was then sent to all persons in the sample not registered to receive home service or help from the districts (n=2031). A follow-up telephone call was made after 1-2 weeks, at which point 365 persons were found non-eligible and 218 non-traceable. Out of the remaining 1666, 1120 persons were unable or unwilling to participate. A total of 546 persons were included in the study.

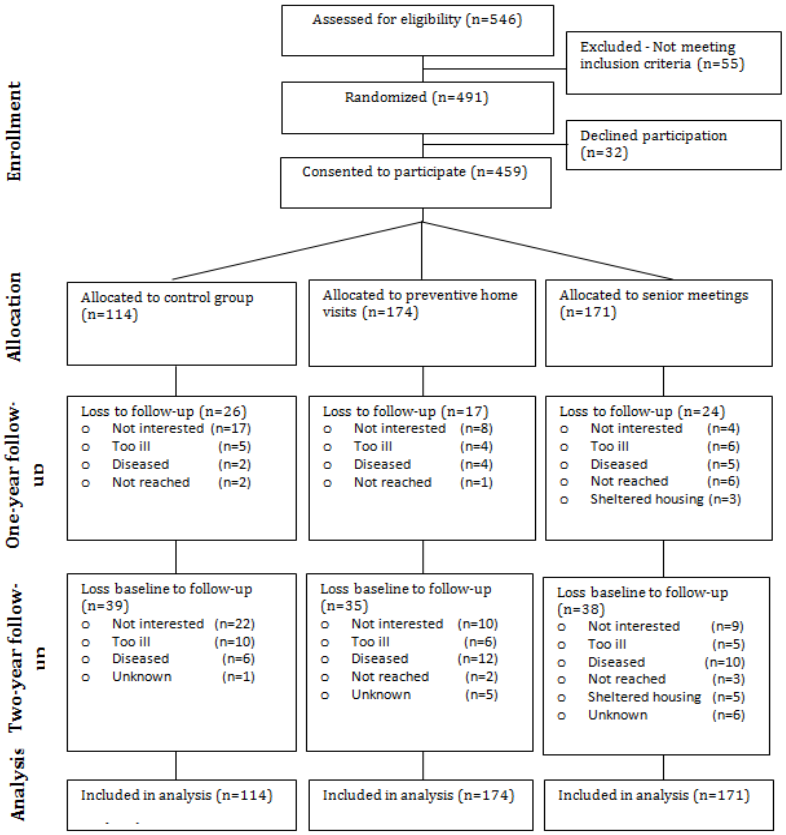
The inclusion criteria for the study were that the participants should:

1. Live in ordinary housing
2. Not be dependent on home help or service or care from the districts
3. Be independent of help from another person in ADL
4. Be without overt cognitive impairment (meaning having a score of 25 or higher on Mini Mental Test).

A first interview was conducted (baseline interview) in the participants' own homes. After the baseline interviews it was found that 55 persons did not meet the inclusion criteria. Opaque sealed envelopes were used to assign the remaining persons (total 491) to one of the three study arms: preventive home visits, senior meetings or a control group. After inclusion 32 persons declined participation, resulting in 459 persons included in the study. The baseline characteristics of the participants are presented in table 4. There were no significant differences between the three groups in terms of demographic data. The median age of the participants in the control group was 86 years (range 80-97), 86 years in the preventive home visit (range 80-94) and 85 years in senior meetings (range 80-94). All the participants assigned to the intervention PHV received the visit, and 97% (n=165) of the participants assigned to the senior meetings attended all four meetings.

Table 4. Baseline characteristics and p-values for differences between study arms in Elderly Persons in the Risk Zone

Characteristics	Control group	Preventive home visits	Senior meetings	P-value
	n=114	n=174	n=171	
	%	%	%	
Median age (range)	86 (80-97)	86 (80-94)	85 (80-94)	0.24
Female	61	64	66	0.63
Living alone	48	57	60	0.10
Academic education	22	23	19	0.69
Non-frail	11	11	14	0.88
Pre-frail	70	66	70	0.86
Frail	19	23	16	0.73
Weakness	9	10	5	0.27
Fatigue	36	39	42	0.63
Weight loss	6	7	5	0.70
Low physical activity	17	18	13	0.36
Poor balance	10	11	7	0.36
Gait speed	6	8	6	0.55
Visual impairment	61	62	56	0.49
Sum Mob-T (median)	6	6	6	0.38
Performing the activity with tiredness (at least one)	77	68	73	0.25
Too tired to perform the activity (at least one)	9	13	6	0.09



* Reasons for declining participation, please see study protocol [11].
†Data for dropouts have been included in the analysis by imputation.

Figure 2. The flow of participants through the study Elderly Persons in the Risk Zone and the reasons for declining participation at the one- and two-year follow-ups.

In **study III**, a total of 17 persons, 12 women and five men, aged 80 to 92, were recruited from the persons who received a structured PHV (n=174). In accordance with the phenomenographic tradition, the participants were chosen strategically in order to represent as many aspects of experiences of a PHV as possible [109-111]. Thus, a purposeful selection of persons with different backgrounds such as marital status, living conditions, age, and perceived health was made. The participants were recruited consecutively one by one over a period of 6 months, and the aim was to include a total of 15 to18 persons. In total, 48 participants received an information letter about

the study directly after the PHV. Those who matched the selection criteria and had agreed to participate, giving their written consent, were contacted by the researcher and the interviews were booked (n=17) (table 5).

*Table 5. Characteristics of the participants in the individual interviews (**study III**), all of whom had participated in the intervention preventive home visits, n=17.*

Interview person	Age	Gender	Living Conditions	Social status	Perceived Health
1	92	Man	Apartment	Living together	Excellent
2	87	Woman	Apartment	Living alone	Fair
3	90	Woman	Apartment	Living together	Excellent
4	89	Woman	Apartment	Living together	Fair
5	87	Man	House	Living together	Good
6	88	Man	Apartment	Living together	Fair
7	81	Woman	House	Living alone	Fair
8	80	Woman	Apartment	Living alone	Good
9	80	Woman	House	Living alone	Very Good
10	83	Woman	Apartment	Living together	Very good
11	80	Woman	House	Living together	Good
12	85	Woman	House	Living alone	Good
13	83	Woman	House	Living together	Good
14	87	Man	House	Living together	Fair
15	80	Woman	House	Living together	Very good
16	82	Man	House	Living together	Very good
17	80	Woman	Apartment	Living alone	Good

The participants in **study IV** were recruited from the persons who attended the senior meetings (n=171). At the final senior meeting, the participants were informed about and asked to participate in a focus group study in order to give their view of participating in the senior meetings. Participation was voluntary, and those who volunteered to participate were contacted by telephone after two to five weeks. Seven men and 13 women, median age 83.5 (range 80-92), took part in the study. The 20 participants were divided into five focus groups. Homogeneity and heterogeneity were important when selecting the participants [112]. Heterogeneity ensures variation in the target group, while homogeneity facilitates discussion. The selection of the participants was based on the assumption that the participants had not known each other before, as they would then have no previous history and would share their experiences more freely and openly. Thus the participants were all from different groups at the senior meetings. The participants were heterogeneous as concerns gender and social status but were homogenous in that they were all independent of help from others and lived at home (table 6).

*Table 6. Characteristics of the participants in the focus group study (**study IV**), all of whom had participated in the intervention senior meetings, n=20.*

	Total In focus groups n=20	Total in senior meetings n=171	1* n= 5	2* n=3	3* n=4	4* n=3	5* n=5
Age, MD	83.5	84	82	82	86	82	81
Women	13	113	4	3	2	1	3
Men	7	58	1	0	2	2	2
Living alone	9	100	4	2	1	0	2
Living Together	11	71	1	1	3	3	3
Excellent, Very Good, Good health	19	142	5	3	4	3	4

*Number 1-5=focus group 1-5

4.3 Data collection

4.3.1 Measures of health and frailty

In **studies I and II** the research assistants (RN, PT, OT) collected data in the participants' own homes at baseline and one and two years after interventions. The research assistants were trained in how to administer the assessments. Inter-rater reliability was checked by a research assistant who had not conducted the interviews verifying the data. To ensure as much standardization of the assessments as possible, study protocol meetings were held regularly throughout the study. The research assistants who collected the data were blind to group assignment.

As the study was explorative, several outcomes were recorded for use in the large study *Elderly Persons in the Risk zone*. To evaluate the effects of the interventions on morbidity, symptoms, self-rated health, satisfaction with health and frailty, the following measurements were used (table 7):

*Table 7. Overview of the outcome measurements used in **studies I-II***

Outcome	Instruments	Measurement	Reference
Morbidity	CIRS-G	Morbidity	[113]
Symptoms	Gothenburg quality of life instrument	Symptoms	[114]
Self-rated health	First question in SF-36	Self-rated health	[115]
Satisfaction with health	Lisat-11	Satisfaction with physical and psychological health	[116, 117]
Frailty: Eight core frailty indicators	North coast dynamometer	Grip strength	[118]
	Gothenburg quality of life instrument (symptom scale)	Weight loss	[114]
	Gothenburg quality of life instrument (symptom scale)	Fatigue	[114]
	1-2 walks/week or less	Low physical activity	[119]
	Berg's balance scale	Poor balance	[120]
	Walking four meters or less in 6.8 seconds or less	Low gait speed	[119]
	KM Chart less than 0.5 in both eyes	Visual impairment	[121]
	Mini mental test <25 points	Cognition	[122]
Frailty: Tiredness in daily activities	Mob-T	Tiredness	[34]

Morbidity

Morbidity was measured with the Cumulative Illness Rating Scale for Geriatrics (CIRS-G) [113], a quantitative rating instrument of the chronic medical illness burden modified for geriatric assessment. CIRS-G contains 14 organ system categories: heart, vascular, hematopoietic, respiratory, eyes-

ears-nose throat and larynx, upper gastrointestinal, lower gastrointestinal, liver, renal, genito-urinary, musculoskeletal, neurological, endocrine and psychiatric illness. The 14 categories are rated as follows: 0 no problem, 1 current mild problem, 2 Moderate disability or morbidity/require "first line" therapy, 3 severe/constant disability and 4 Extremely severe with immediate treatment required. The interviewer performed the rating (0-4) after the participants had made their reports. In this study we defined morbidity as having at least a number 2. i.e. moderate disability or morbidity, which requires first-line therapy. In **study I** the number of changes over time in moderate disability was summarised.

Symptoms

Self-reported symptoms were measured with the "The Göteborg Quality of Life Instrument (GQL)" [114], which is a self-estimate tool giving reliable and stable measurements of symptoms. The GQL instrument is divided into two parts, a symptom section and a well-being section. In **study I** only the symptom section was used. This part of the questionnaire contains 30 common symptoms with a yes or no response format. The participants were asked if they were troubled with these symptoms during the last three months. In **study I** the number of changes over time in symptoms was summarised.

Self-rated health

Self-rated health was measured by the first question in SF-36 [115], where the participants were expected to choose one of the following responses to the question "in general, would you say your health is" 1) excellent, 2) very good, 3) good, 4) fair, or 5) poor. In **study I** the response alternatives were operationalized into good (excellent, very good and good) and poor (fair and poor), and the number of changes in self-rated health over time was summarised.

Satisfaction with physical and psychological health

Satisfaction with physical and psychological health was measured with the Lisat-11 question about how satisfied you are with physical health and psychological health. Each item is scored on a 6-point scale from 1 (very dissatisfied) to 6 (very satisfied) [116, 117]. In **study I** the response alternatives were operationalised into satisfied (very satisfied, satisfied, rather satisfied) and not satisfied (very unsatisfied, unsatisfied and rather unsatisfied). The number of changes in satisfaction with health over time was then summarised.

Frailty measured with eight frailty indicators

Frailty was measured with the help of eight core frailty indicators: weakness, fatigue, weight loss, low physical activity, poor balance, gait speed, visual impairment and cognition. The outcome was measured by the number of frailty indicators (0-8). The cut-off for frailty in **study II** was: weakness, grip strength as measured by North Coast dynamometer [118] below 13 kg for women and 21 kg for males for the right hand, and below 10 kg for women and 18 kg for males for the left hand; fatigue, answering yes to the question: "Have you suffered any general fatigue/tiredness over the last three months?" [114]; weight loss, answering yes to the question: "Have you suffered any weight loss over the last three months?" [114]; low physical activity, 1-2 walks/week or less [119]; poor balance, 47 or lower on Berg's balance scale [120]; low gait speed, walking four metres or less in 6.8 seconds [119]; visual impairment, a visual acuity of $\leq$0.5 in both eyes using the KM chart [121], and cognition, < 25 points in Mini Mental Test [122]. For more details, see the study protocol [11]. The sum of frailty indicators for each person (0-8) was calculated and dichotomised as non-deterioration/ deterioration in the final analysis. Deterioration in the number of frailty indicators was measured from baseline to each follow-up. Those who were defined as frail $\geq$3 frailty indicators were counted and analysed at each follow up.

Frailty measured as tiredness in daily activities

Tiredness in daily activities is a subjective aspect of frailty measured with the Mob-T Scale [123]. Participants were asked if they performed the activities; (1) walking indoors, (2) getting outdoors, (3) transferring, (4) walking outdoors in nice weather and (5) bad weather, and (6) managing stairs with three response options: perform it without tiredness, perform it with tiredness, or too tired to perform the activity. A cut-off value between those who perform the activity without and with tiredness and those who were too tired to perform the activity was chosen. Longitudinal changes were measured by the number of persons who deteriorated from baseline to the one-year and two-year follow-ups.

4.3.2 Individual interviews

In **study III** individual interviews with the 17 participants took place two to three weeks after they had received the intervention PHV. The interviewer (the author) was a registered public health nurse used to working with older persons. The interviewer had not been involved in conducting the intervention PHV. To create an informal interview situation, the interviews were carried out in the participants' own homes. The interviews started with a few minutes 'small talk' and brief information about the procedure of the

interviews. The interviews were semi-structured i.e. followed an interview guide which had open questions. As an introduction the participants were asked to indicate how they experienced their current health by selecting one of the alternatives on a 5-point scale: "excellent health", "very good" "good" "fair" or "poor". The reason for asking this question was to encourage the participants to start reflecting upon their health, as well as obtaining a description of the sample. The participants were then asked to describe their experiences of the PHV and their conceptions of its consequences for their present and future health. Follow-up questions and prompts were used, such as 'Tell me more about that' or 'What does this mean to you?' and 'Can you clarify?' The ambition was to let the participants concretize their experiences as much as possible. The interviews were recorded on tape and lasted for an average of 36 minutes (range 26-60).

4.3.3 Focus-group interviews

In **study IV,** five focus group interviews were conducted. Focus groups usually consist of a group of three to 12 persons who represent the target group and a moderator who leads the discussion. The group process is meant to encourage participants to clarify not only what they think but also why they think in a certain way. The collective nature of the focus groups can empower participants and validate their views and experiences. This is especially important when interviews are conducted with persons with limited power and influence [124]. The focus group discussions were conducted in a conference room at a healthcare centre. Each focus group met once. The discussions in the focus groups were led by a moderator, a public health nurse and doctoral student (the author) together with a co-moderator (also a public health nurse). Both the moderator and the co-moderator had good experience of working with groups and were not involved in conducting the senior meetings. The sessions began with the moderator informing the participants about the study, its purpose and the structure of the focus groups. The participants were informed about what was expected and not expected of them. The moderator made clear that they were there because they wanted to learn from them, that they were the experts. The moderator introduced a discussion topic, and the participants were encouraged to discuss the topic openly. The main topic was; "How did you experience the senior meetings?" The moderator's task was to pose questions to deepen the discussion and ensure that participants who were silent were given a chance to speak. The entire focus group session was recorded on tape and transcribed verbatim. Each focus group discussion lasted between one and a half to two hours, which included a break for refreshments.

4.4 Analysis

4.4.1 Statistical analysis

In **studies I-II** the analyses were made on the basis of the intention-to-treat principle, i.e. all participants included in the studies were analysed in the group that they were originally assigned to [125]. The basic assumption for imputing data was that very old persons are expected to deteriorate over time in the natural course of the ageing process. Therefore, the imputation method chosen was to replace missing values with a value based on the Median Change of Deterioration (MCD). MCD is a form of the worst change of deterioration which is related to the imputation of worst case [126]. The MCD of an outcome was calculated for each follow-up. This value was added to the last genuine individual value recorded and imputed, substituting the missing value at the two follow-ups. Missing values due to death were imputed with worst-case values at the respective follow-up. The results from the analysis using MCD were compared to complete case analysis, which showed aligned trends.

The number of participants that had changed/deteriorated with regard to morbidity, symptoms, self-rated health, satisfaction with health and frailty compared to baseline was calculated during the course of the study. In the final analysis the participants were dichotomized into deteriorated/not deteriorated from baseline to follow-up. Also, the number of frail participants ($\geq$3 frailty indicators) was summarised at one and two years. Analyses were made using an overall Chi2 test, and were thereafter compared group-wise by calculating the Odds Ratio (OR). Two-sided significance tests were used throughout. A P-value of 0.05 or less was considered significant. Statistical analyses were performed using PASW Statistics, version 20,0 (IBM SPSS Inc, Chicago, IL, 2009).

4.4.2 Phenomenographic method

The phenomenographic method was used in **study III** to explore how the participants of PHV experienced the intervention. The phenomenographic method has its origin in pedagogical research and aims to define the qualitatively different ways in which persons experience, understand, perceive or conceptualize a phenomenon or a certain aspect of reality [109-111]. In order to understand and manage the complex world, humans develop knowledge about the world around them. The area of interest to phenomeogaphy is what this knowledge contains. What is perceived is the content of the relationship between a human being and something of the outside world i.e. the phenomenon. It is not the thing in itself, but what is

shown to our senses that is central [127]. Thus fundamental to phenomenography is the distinction between how something is and how something is perceived. The first-order perspective, deals with the facts, the true nature of the phenomenon, and the second-order perspective concerns how someone experiences it [128]. The phenomenographer tries to produce an empirical description of the different ways of perceiving the world.

The analysis of the individual interviews in **study III** was based on the phenomenographic method described by Dahlgren and Fallsberg [129]. The phenomenographic analysis comprised the following steps: all the interviews were first read carefully and repeatedly to obtain a total concurrent overview, a sort of familiarisation. The second step, condensation, was a selection procedure. Qualitative meaning quotes that dealt with the experience of the PHV were extracted from all interviews to achieve a concentrated and representative version of entire dialogues. The quotes selected made up a pool that formed the basis for the following steps in the analysis. The third step, comparison, was to contrast the extracted quotes with each other in order to uncover sources of variation or agreement. In the grouping step, similar quotes were grouped together. The next step, articulating, was an attempt to describe the essence of the similarity within each group. The labeling step gave the categories names that corresponded to the essence of their meaning. The last step, contrasting, compared categories with each other to arrive at a definitive description of the unique character of each category. In this final step the various descriptions dealt with in the categories were defined and named, summarizing the common significant meaning in each category.

There was constant interplay in the entire process between the various steps of the analysis. The ambition was to ensure that each category was qualitatively unique, that they did not overlap, and that there was empirical support for each category. As the focus was not on the subjects but on the qualitative meaning of each category, the categories were mutually exclusive, and each interviewee could belong to more than one category. The whole sequence of steps in the analysis was followed separately by the author and a co-author before joint discussions leading to consensus. Finally, a third author listened to all the recorded material and validated the analysis. In the validation process the authors compared their findings for similarities and differences until agreement was reached.

4.4.3 Focus-group method

The focus-group method was used to evaluate senior meetings **(study IV)**. In this method the discussions among the participants generate the data. The interaction of the participants in the groups is thus an important part of the method [130, 131]. Focus groups are explorative in nature and can be useful in investigating a phenomenon; they are also suitable in process evaluations when the researcher is interested in the impact of an intervention [132].

In **study IV** the analysis of the focus groups was based on a method described by Kreuger [112]. The analyses started in the focus group interviews during which the moderator was able to capture the essence of the discussions. Throughout the analysis the researchers were guided by the aim of the study. The author analysed data together with the co-authors. These analyses were made separately to increase the validity of the analysis.

The authors first read the transcribed discussions several times to get a feeling for the interviews as a whole. All discussions relevant to the aim of the study were then identified. The next step was to identify and systematise the raw data into categories, which meant that participants' actual discussions fell into an appropriate category. At this stage the working material was still in the form of raw data. The categorised data were then summarised, and an interpretive step aimed at providing a deeper understanding of what was found in the discussions was taken in order to interpret the meaning of the categories. The interpretation was based on descriptive statements where relations and patterns prepared the way for identifying a theme, one main category, two categories and five sub-categories. After this step quotations that showed the discussion in the group were selected to illustrate the result. Finally, the co-moderator of the focus groups read though the analysis and had the opportunity to make comments to the author. The co-moderator verified the analysis and made no changes.

5 ETHICAL CONSIDERATIONS

The studies were guided by the ethical principles of respect for autonomy, non-maleficence, beneficence and justice [133] and were conducted in accordance with the Helsinki Declaration [134]. The study *Elderly Persons in the Risk Zone* was approved by the he Regional Ethical Review Board in Gothenburg (650-07).

The principle of non-maleficence was considered in the sense that all the data were coded, and only the research assistants had access to the data. The coded data were stored in a locked cabinet. The interviews in **studies I and II** were conducted in the participants' own homes, and the research assistants made sure to point out that participation was voluntary at each follow up. The outcome measurements collected for **studies I and II** were only a part of a large amount of data obtained with questionnaires. These interviews were sometimes very time-consuming and tiring for the participants. Some questions were of a sensitive nature. In some cases when the questions were very time consuming and tiring, the interviews were divided into two parts or were followed by a telephone call. The research assistants were very careful about telling the participants that it was voluntary to answer the questions or perform the tests. In the individual interviews and the focus group interviews (**study III and IV**) the data were coded and stored in a place that only the author had access to. The interviewer made clear that it was voluntary to answer the questions asked during the interviews. Written informed consent had been obtained from all respondents in the above studies.

The principle of beneficence was considered in the sense that the participants in both the intervention-groups and the control group in **studies I and II** were referred or guided to help if the research assistants discovered a need for help at the follow up visits. For example, a participant might record an alarming score on the depression scale or report a health problem. Also, in the individual interviews and in the group meeting **(studies III and IV**) the interviewer took care to observe any need of help. However, no help was necessary.

The principle of justice was considered in the sense that the participants that agreed to participate in **studies I and II** had an equal chance of receiving an intervention through the randomisation procedure. Also, the participants that had been randomised to the control group had an opportunity to receive an intervention after the study period. The fact that the study *Elderly Persons in the Risk Zone* focuses on very old persons whose needs may be less than

many others as they are still independent of help also need to be addressed. The reason for choosing this group was based on the assumption that those who benefit most from preventive interventions are those who do not yet rely on help but are at risk of frailty (are pre-frail) [8, 78].

6 RESULTS

The results from the four studies are presented under the following two headings: Intervention outcome (**studies I-II**) and User perspective (**studies III-IV**). The results are described in detail in the separate papers.

6.1 Intervention outcome

Dropouts

By the time of the one-year follow-up in the study *Elderly Persons in the Risk zone* 15 % (n=67) of the participants had dropped out, and at the two-year follow up the dropout rate was 24% (n=112). "Not interested" was the main reason for dropping out in the preventive home visit group and the control group, while the main reason for dropping out in the senior meetings group was more varied. A significantly larger proportion of the dropouts belonged to the control group. At one year 23% had dropped out in the control group, 10% in the PHV group and 14% in the senior meetings group (p=0.008) and at the two-year follow up 34% had dropped out in the control group, 20% in the PHV and 22% in the senior meetings (p=0.036). There was no significant difference between the participants and dropouts concerning demographic data at baseline. However, the dropouts at the one-year follow-up had significantly worse health at baseline compared to the participants (p= 0.03), and had used the home help service in the districts to a greater extent (p=0.002). The dropouts at the two-year follow-up were significantly older (p=0.001), had lower balance scores (p=0.02), and were less physically active (p<0.001) at baseline. At the one-year follow-up a total of 11 persons (2%) had died, and at two years the number had risen to 28 (6%).

Morbidity

The OR of a progression in morbidity was significantly lower at the one- and two-year follow-ups in both the PHV (p=0.001/0.035) and senior meetings groups (p= 0.048/0.008) compared to the control group. The OR ratio was 0.44 (95% CI 0.27-0.73) for the PHV and 0.61 (95% CI 0.38-0.99) for senior meetings after one year and 0.60 (95% CI 0.37-0.96) for the PHV group and 0.52 (95% CI 0.32-0.84) for the senior meetings group after two years.

Symptoms

We could not demonstrate that there was any significant difference concerning the progression of symptoms in either the PHV or the senior

meetings group at the one- and two-year follow-ups compared to the control group (table 8).

Self-rated health

The participants in senior meetings had a significantly lower OR (p=0.039) of deteriorating in self-rated health compared to the control group at the one-year follow-up. The OR was 0.55 (95% CI 0.31-0.97). However, there was no significant difference between either of the interventions and the control group at the two-year follow-up.

Satisfaction with physical and psychological health

The OR of deterioration in satisfaction with physical health was significantly lower at the one- and two-year follow-ups in both the PHV and the senior meetings groups compared to the control group, the OR being 0.49 (95% CI 0.28-0.87) in the PHV group and 0.57 (95% CI 0.32-1.0) in the senior meetings group at one year and 0.43 (95% CI 0.22-0.84) in the PHV and 0.28 (95% CI 0.14-0.59) in the senior meetings group at the two-year follow-up. Concerning psychological health the OR of deteriorating in satisfaction was significantly lower in both the PHV and senior meetings group at the one- and two-year follow-ups. The OR of deterioration was 0.45 (95% CI 0.23-0.90) in the PHV and 0.34 (95% CI 0.17-0.72) in the senior meetings groups compared to the control group at one year, and 0.30 (95% CI 0.16-0.56) at PHV and 0.40 (95% CI 0.22-0.72) in the senior meetings group compared to the control group at the two- year follow-up (table 8).

Table 8. The proportion (%), Odds Ratio (OR), 95% Confidence Interval (CI), and P-value for deterioration from baseline in morbidity, symptoms, self-rated health and satisfaction with health between study arms in Elderly Persons in the Risk Zone.

OUTCOME MEASURE		CONTROL		A PREVENTIVE HOME VISIT				SENIOR MEETINGS			
	Year	%	OR	%	OR	(CI)	P-value	%	OR	(CI)	P-value
Morbidity	1	46	1	27	0.44	(0.27 to 0.73)	0,001	34	0.61	(0.38 to 0.99)	0.048
	2	57	1	44	0.60	(0.37 to 0.96)	0,035	41	0.52	(0.32 to 0.84)	0.008
Symptoms	1	56	1	49	0.76	(0.48 to 1.23)	0.265	58	1.10	(0.68 to 1.78)	0.696
	2	61	1	54	0.66	(0.41 to 1.07)	0.093	61	0.87	(0.53 to 1.42)	0.584
Self-rated health	1	27	1	18	0.58	(0.33to 1.02)	0.060	17	0.55	(0.31 to 0.97)	0.039
	2	33	1	24	0.64	(0.38 to 1.07)	0.090	32	0.95	(0.57 to 1.57)	0.837
Satisfaction with Physical health	1	28	1	16	0.49	(0.28 to 0.87)	0.015	18	0.57	(0.32 to 1.00)	0.049
	2	21	1	10	0.43	(0.22 to 0.84)	0.013	7	0.28	(0.14 to 0.59)	0.001
Satisfaction with Psychological health	1	19	1	10	0.45	(0,23 to 0,90)	0.023	8	0.34	(0.17 to 0.72)	0.004
	2	29	1	11	0.30	(0.16 to 0.56)	0.000	14	0.40	(0.22 to 0.72)	0.002

Frailty measured with frailty indicators

There were no significant differences between the intervention groups and the control group as concerns deterioration in the number of frailty indicators between baseline and one- and two-year follow-ups. The participants that were defined as frail ($\geq$3 frailty indicators) increased in number in all three study groups during the two-year study period, from 19% to 59% in the control group, from 23% to 52% in the PHV group and from 16% to 47% in the senior meetings group.

Frailty measured as tiredness in daily activities

The OR of becoming increasingly frail at the one-year follow-up measured as tiredness in daily activities was significantly lower in both intervention groups compared to the control group, the OR being 0.47 (95% CI 0,27-0,81) for the PHV and 0.55 (95% CI 0.32 -0.94) for the senior meetings. At the two-year follow-up there were no significant differences between the groups (see table 9).

Table 9. The proportion (%), Odds Ratio (OR), 95% Confidence Interval (CI), and P-value for deterioration from baseline in frailty between study arms in Elderly People in the Risk Zone.

OUTCOME MEASURE		CONTROL		A PREVENTIVE HOME VISIT				SENIOR MEETINGS			
	Year	%	OR	%	OR	(CI)	P-value	%	OR	(CI)	P-value
Deterioration in frailty (sum of frailty indicators) from baseline	1	38	1	44	1.28	(0.79 -2.08)	0.31	49	1.56	(0.96- 2.52)	0.07
	2	68	1	58	0.64	(0.39 -1.05)	0.07	60	0.68	(0.4- 1,12)	0.13
Frail (≥3 indicators)	1	39	1	34	0.79	(0.49-1.28)	0.33	34	0.79	0.48-1.29	0.33
	2	59	1	52	0.77	(0.48-1.24)	0.28	47	0.63	0.39-1.02	0.06
Deterioration in frailty (tiredness in daily activities) from baseline	1	33	1	19	0.47	(0.27 -0.81)	0.006	22	0.55	(0.32 -0.94)	0.029
	2	39	1	30	0.65	(0.40 -1.07)	0.093	32	0.73	(0.44-1.19)	0.206

6.2 User perspective

Experiences of the Preventive Home Visit (PHV)

The results of the individual interviews of the participants that received a structured PHV (**study III**) show that the participants experienced the intervention in a variety of ways. The participants felt that the PHV could lead to positive consequences for health such as accentuating their intrinsic human value, bringing a feeling of security and giving an incentive to action. On the other hand, a few of the participants found the PHV difficult to assimilate, either because they felt too ill or because they felt that they could manage on their own. The analysis resulted in four categories: 1) the PHV made me visible and proved my human value: 2) the PHV brought a feeling of security: 3) the PHV gave an incentive to action; 4) the PHV was not for me. The experiences expressed were multidimensional, and most of the interviewed participants expressed experiences that belonged to more than one category (table 10).

Table 10. Allocation of the 17 PHV participants interviewed in study III to the four categories

Category	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
1*			x				x	x	x	x	x		x				x	8
2*	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	16
3*	x	x	x	x	x	x		x	x		x	x			x	x	x	13
4*												x		x			x	3

*1.The PHV made me visible and proved my human value 2.The PHV brought a feeling of security 3.The PHV gave an incentive to action and 4.The PHV was not for me.

In the category The PHV *made me visible and proved my human value* the participants expressed that the PHV had proved their intrinsic value as human beings despite their age, and they stressed how important it was that someone was interested in the thoughts and needs of an older person. Earlier participants of this category had experienced being viewed as insignificant, even invisible in social and healthcare settings. The fact that someone now seemed to care about older persons and that resources were being allocated to enhance their health made them feel that they were still important members of society and that their status as valuable human beings was confirmed. Also, the participants appreciated that someone had spent time with them and it was considered an important aspect of the value of the PHV.

The participants in the PHV expressed that being aware of whom and where to turn to when needing help ***brought a feeling of security***. The participants valued the information they received at the PHV, and they had saved the brochures for future use in case of need. They found it easier to absorb and understand the information when receiving information face to face as they could then discuss the information and eventual problems with the visitor. Meeting a person whom they could later contact also gave them a sense of security.

The experience of the PHV being *an incentive to action* meant that the intervention motivated the participants to start thinking about how to postpone future health risks by keeping several steps ahead. Thus the PHV had evoked awareness that they were capable of influencing their future health. This awareness brought a new and more positive way of looking at the body. The participants expressed that experiencing the body in a positive way and being assured that it was possible to influence it was especially

important, as the general view in society was that ageing primarily means negative bodily changes.

Some of the participants in the PHV group felt that as long as they were independent of help from others and could manage in daily life they were not interested in the information offered at the PHV. These participants were proud of being able to manage on their own; this gave them a sense of control over their situation. Some of the participants said that before the PHV they had already adapted to an experienced, or expected, decrease in physical capacity in various ways and that they could search for and obtain information when they felt that they needed it. They were content with life and expressed that hopefully they would never need the information and help that was offered by the district. Consequently they experienced that *the PHV was nothing for me*. In contrast, some of the participants in this category expressed hopelessness and lack of trust in the future. Thus, the PHV was considered to be of no importance because they felt too ill.

Experiences of the Senior Meetings

The results of the focus-group interviews about the participants' experiences of senior meetings (**study IV**) consist of one theme, two categories and five sub-categories. The theme in all the focus group discussions was "living in the present", which accounts for the overall experience described when talking about the senior meetings. The main category *key to action* was the general term that described how the senior meetings were experienced. *Key to action* contains the categories *belonging to a supportive environment* and *learning a preventive approach*. The category *belonging to a supportive environment* in turn includes the sub-categories of *learning from each other, gaining good examples* and *sharing problems with others*. The category *having learned a preventive approach* contains the sub-categories *gaining greater awareness and understanding* and *learning to act strategically* (figure 3).

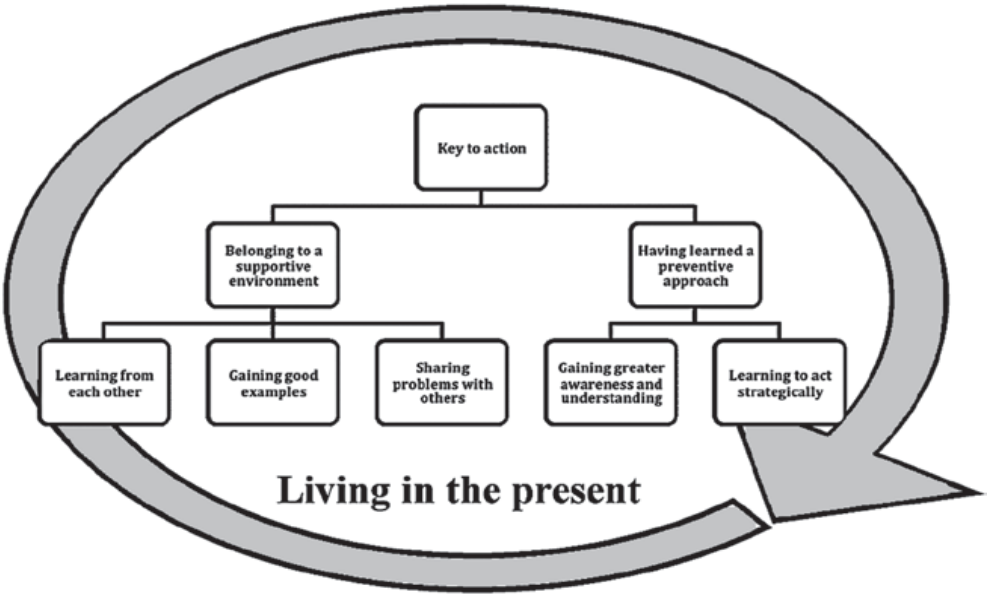


Figure 3. Theme, categories and subcategories from study IV, the experiences from the participants in the senior meetings.

Living in the present

Participants in the senior meetings expressed that they were living in the present, and this affected how they perceived the intervention. Living in the present meant that it was difficult for the participants to accept that they were old, or that they felt too healthy to absorb information that dealt with future needs. When living in the present, the older person deals with problems when they occur or when health deteriorates. The participants took one day at a time and did not worry in advance. After all there was an awareness of the situation and the fact that it could change at any time. This awareness seemed to grow with advancing age. For the participants in senior meetings, living in the present had a dual impact on how the meetings were experienced. They could have difficulty accepting what the meetings tried to accomplish. For instance, they found it difficult to accept information that was experienced as not being right for that point in time but rather applicable in the future. However, living in the present also meant that the meetings were experienced as a wake-up call, as a *key to action*.

A key to action

A key to action means that the intervention was experienced as something that could allow the participants to make more conscious choices in everyday

life. Despite the influence of living in the present, the senior meetings aroused an interest in different questions that the participants had not previously thought about or acted upon. Both the group environment and the fact that the meetings were held by various professionals, who contributed to new knowledge, served as a motivation for making changes in their daily lives. The changes could refer both to behaviour and way of thinking and the environment. The main category of key to action can be divided into two categories: *belonging to a supportive environment* and *having learnt a preventive approach*.

Belonging to a supportive environment

Belonging to a supportive environment meant that the group setting and the atmosphere in the meetings allowed the older person to experience favourable conditions for learning. The older person was included in a context where there was an interaction between persons in similar situations, which allowed them to use each other as tools in the learning process. The participants used the terms egalitarian and permissive to describe the environment. This supportive environment may be divided into the sub-categories: *learning from each other, gaining good examples* and *sharing problems with others.*

Meeting other persons in the same situation allowed the participants to *learn from each other*. Knowledge that came from someone who had experienced and who had gone through what was being discussed made it easier to relate to. The participants described that it was never too late to learn new things, and that interest in learning new things increased with age. Meeting and listening to other persons in a similar situation, talking about how they lived and how they dealt with different everyday situations inspired the participants. The ones who were older, or of the same age but still had good health, gave the other participants the opportunity to *gain good examples* to follow. The participants also felt that they had gained a new perspective on things that could lead to a more positive view of their own life situation and of ageing in general. In the senior meetings the participants could talk openly about different subjects on an equal level, and were able to acquire an understanding from peers that wasn't possible to acquire from someone who did not share the problem or the fact of living with old age. The participants felt that they received important support in reasoning about many questions that they had on their minds. They felt that *sharing problems with others* enabled them to obtain confirmation that they were doing things right or were living in the right way.

Having learned a preventive approach

The senior meetings aroused an interest in how to postpone the deterioration that can come with advancing age and how to train different functions to maintain and improve them, things that the participants had not thought of or acted upon before. The senior meetings prepared the older persons to manage daily life in a way that made them feel more secure in their everyday activities. The preventive approach meant dealing with problems before they occurred, having the knowledge and strategies to do so. *Having learnt a preventive approach* can be further described by the sub-categories of *gaining greater awareness and understanding* and *learning to act strategically.*

Becoming older was experienced as associated with many questions, and the meetings provided the participants with answers to some of them. The holistic picture that could be presented thanks to the collective knowledge in the different professions represented at the senior meetings, contributed to the participants' *gaining a greater awareness and understanding* of different aspects of ageing. It was also felt to be due to the discussions of the different subjects in the group setting. The instructional material (booklet) was an important tool and something that one could return to if one had forgotten anything. The participants felt that they had *learned to act strategically*. Acting strategically meant being prepared, being careful in situations that could be hazardous, It also involved trying to train functions before they deteriorated. The strategies were explained as preparing the participants for managing their daily lives more easily.

7 DISCUSSION

7.1 Discussion of the method

Two opposing scientific approaches have been adopted in this thesis. A hypothetic deductive method was used in the first part of the thesis (**studies I-II**). According to this method, the researcher has a theory and then tests it [135]. The hypothesis, i.e. the assumption being tested, has the property to tell us that if there is a certain condition, then a certain result may occur. In the second part of the thesis (**studies III-IV**) an inductive method was used. As opposed to the hypothetic deductive method, where the theory comes before the observations, here the researcher first collects data by observing a phenomenon, analyses the data, and then forms a theory. The observations are not controlled by any preconceived opinion or theory [136]. Neither of these methods is completely reliable, and there are potential methodological errors in all studies. A discussion of the major methodological issues of this thesis follows below.

Attrition

The highest reliance is placed on the results of the Randomised Controlled Trial. It is considered to be the gold standard of trials [137, 138]. However, the truth of any inference we make has to be questioned. Attrition is the biggest threat to a RCT since it has the potential to eliminate the even distribution of the randomisation [139].

In **studies I-II** there was both primary and treatment-correlated attrition. When recruiting the participants in *Elderly Persons in the Risk zone* an invitation letter was sent to all persons 80+ without home service or help in two urban districts of Gothenburg (n=2031). Of those a total of 546 (27%) wanted to participate. However, 55 persons who replied to the invitation did not meet the inclusion criteria. Many of those who received the letter (n=2031) might not have been primary dropouts (due to not meeting the inclusion criteria) but we could not verify this. This large primary drop-out-rate may influence the generalisation of the results [125]. Earlier studies have shown that the older the participants are in a study, the higher the number of drop outs [140]. In **studies I and II** a large proportion declined to participate because they were not interested or had no time. It also became evident at the senior meetings as well as at the preventive home visits that these very old persons did not regard themselves as a target group for interventions and had been hesitant about participating in the study. This seems to be a methodological problem when designing interventions among independent

very old persons. Although few drop outs are desirable, it is important to ask whether those who participated in the study are representative of the population of interest. The target of **studies I and II** was independent very old persons at risk of frailty, and the inclusion of those at risk of frailty was rather successful, with in total 68% being in a pre-frail phase at baseline.

In **studies I** and **II**, the number of participants lost to follow-up was not evenly distributed between the groups, and it is likely that this difference was related to group allocation and did not occur at random. This bias is called treatment-correlated attrition; it lowers the statistical power and is a threat to internal validity [138]. To preserve the integrity of the randomisation, an intention-to-treat (ITT) analysis was made [125], where all missing data were imputed. The ITT is known to be the only chance to avoid this bias and is recommended by the Consolidated Standards for Reporting Trials (CONSORT)[141]. According to Eysenbach [142], a high attrition rate and an intention-to-treat analysis still decrease the power to detect differences between groups. The average dropout rate in **studies I and II** was, however, low (15 %) considering the advanced age of the group.

As the strategy for dealing with missing data should depend on the underlying reason for it [143, 144], the choice of imputation method was based on the missing value analysis. The dropouts were shown to have significantly worse health at baseline, had used the home help service to a greater extent and were significantly older than the participants. Subsequently, the data were not classified as missing at random [143]. In **studies I and II** the data were therefore imputed according to the assumption that older persons are expected to deteriorate over time, and a Median Change of Deterioration (MCD) was used, which is further elaborated in Gustafsson *et al*. [145]. Missing values due to death were imputed using worst-case rank [146]. No statistical strategy can fully deal with all types of missing data, and all methods of analysis have assumptions that cannot be fully justified from the data. This assumption was, however, verified by our analysis of the dropouts and we found support for it in the study by Hardy *et al.* [147] who argue that dropouts in interventions targeting older persons are more likely to show worse outcomes. Despite this there are other ways of approaching missing data, and different approaches may have led to different results. For example, different approaches for different types of reasons for dropouts could have been used as we did with the deceased. However, we based our decision on clear assumptions, and the conservative choice of imputation method used in **studies I and II** rather underestimates the intervention effects.

Generalisability

As stated above, the large primary drop-out might have implications for the generalisation of the results. Another threat to external validity is the setting [148]. The general educational and income levels of residents of the two urban districts included in **studies I and II** were somewhat better, and their sickness rate somewhat lower, than in Gothenburg as a whole. This could affect external validity in two ways. The fact that the participants in the studies were well educated and in better health could have meant that the interventions had less impact than they might have had somewhere else. On the other hand, being well educated might have made it easier to understand new information, which could have led to a greater impact. To be able to generalise the results from **studies I and II** to a broader clientèle, further evaluations are needed in different contexts. The experiences of *Elderly Persons in the Risk Zone* form the basis of an ongoing study evaluating PHV and senior meetings to older immigrants.

Using both subjective and objective outcome measures

The outcome measurements in **studies I and II** were both subjective and objective and selected very carefully to make sure that they had clear psychometric properties, i.e. were valid and reliable for the target group, and that they covered different components of health and frailty. Most of the outcome measures were of a subjective nature, i.e. the participants rated their experience on a scale presented by the research assistant. However the CIRS-G scale (**study I**) was based on participant's statement of their medical illness burden, which was then rated by the research assistant according to a manual, and frailty measured with eight frailty indicators included different tests of physical functioning. As subjective measures are known to be coloured by personality, culture and other factors [149] and might be induced merely by asking about them, they might seem questionable i.e. so called social desirability bias. Savovic *et al.* [150] found that lack of double blinding was associated with exaggeration of intervention effect in trials with subjective outcome measures. This suggests that there might be a risk that subjective outcomes have a placebo effect. The subjective reporting of an objective measure is also associated with a response error [151] with underreporting instead of overestimation. In contrast, Wilhelmsson *et al*. [152] reported that asking older persons about their health and illness yields a broader picture of their health than looking at medical records. Consequently, acknowledging the risk of overestimation and underreporting of subjective measures, subjective and objective measures might together capture a broader picture of the older person's health consistent with a holistic approach to health.

Trustworthiness in qualitative studies

In qualitative research the quantity is not important; it is the quality of the data material that determines how credible the study is. According to Lincoln and Guba [153], this includes the truth and the believability of the data and the interpretations made from them. Therefore some choices made when choosing participants and conducting the interviews need to be discussed.

In study III 17 participants were included, while 20 persons participated in **study IV**. This decision was based on the fact that nothing new had emerged during the last interviews. In **study III** it was decided beforehand that 15-20 participants were needed and to stop interviewing when nothing new emerged, and in **study IV**, five focus groups were booked with the proviso that more interviews could be conducted if needed. This was a choice that the researchers made at that time, and there is no way of ensuring that nothing new would have emerged if several more interviews had been conducted.

Other than the number of participants, the heterogeneity and a variation of the study participants are important to ensure credibility [137]. In accordance with the phenomenographic tradition, the participants **in study III** were chosen strategically in order to represent as many aspects of experiences of a PHV as possible. Thus, a purposeful selection of persons with different backgrounds such as marital status, living conditions, age, and perceived health was made. A limitation was that only five men were included. Another limitation was that all the participants reported reasonable, good or excellent health when the interviews were introduced, while no participant reporting bad health agreed to participate. However, as *Elderly persons in the Risk Zone* addressed home-dwelling persons without overt cognitive impairment who managed their daily activities on their own, the ones with bad health were not the target group. **In study IV** the participants were heterogeneous as concerns gender and social status but homogeneous as concerns that they were all independent and lived in ordinary housing. Homogeneity and heterogeneity are important aspects when selecting participants in focus-group studies [112]. Heterogeneity ensures variation in the target group, while homogeneity facilitates discussion.

The limited number of participants in each of the focus groups in **study IV** might be questioned. In the focus group literature larger groups with up to 12 participants are mostly recommended [124]. However, small groups of three to six participants have been shown to be very dynamic, and the outcome of the discussion depends more on the involvement of the participants than on the number of participants [154]. Smaller groups were chosen because some of the participants had hearing problems, and they experienced difficulty

hearing even in these smaller groups. The focus groups functioned very well, and the discussions in those groups with three participants were as rewarding as those with five.

The length and the depth of the interviews may also be mentioned when discussing credibility. In **study IV** the focus group interviews lasted for 1.5-2 hours including a coffee break, while the individual interviews in **study III** lasted for an average of 36 minutes (range 26-60). The focus group interviews were both longer and, because of the discussions, more profound than the individual interviews. However in the individual interviews each person had more space, which might have made it easier for some persons to discuss matters of a more private character. In phenomenography the second-order perspective is central [155]. This means that the focus of the interviews in **study III** was to capture the participants' different ways of thinking rather than giving a superficial description of the phenomenon studied, in this case the PHV. In the individual interviews, the degree to which the participants wanted to open themselves in the interview situation varied, and in one or two of the interviews they chose to describe the content of the home visit and to show the brochures they had received rather than talking about their own thoughts and experiences. This meant a challenge to the interviewer. On the other hand, other participants described their experience of the PHV and its consequences in great detail. However, despite a depth in both the focus group interviews and the individual interviews, it is impossible to exclude the possibility that there may be other ways of experiencing both the senior meetings and the PHV than those reported in **studies III and IV**.

One measure to strengthen the creditability is to verify the analysis by letting the participants read the interpretation of the data material and to agree or correct it [153]. **In study IV** the co-moderator who was present in all focus group interviews read the interpretation of the data and verified it without changes. However in **study IV** no verification was made, which is a limitation of the study. There is no way of ensuring that the participants really shared their profound experiences with the interviewer, or that the interpretation of what has been said is correct, but to strengthen the credibility the researchers tried to stay as close to the participants' statements as possible in the analysis and when describing the findings. Lincoln and Guba [153] recommend that a triangulation with a combination of qualitative and quantitative methods could maximise the ability to bring different strengths together and strengthen the credibility. Consequently, the quantitative results from **studies I-II** strengthen the qualitative from **studies III-IV**.

Preconception

A common question in qualitative analysis is how much the researcher is coloured by preconceptions. No method is neutral, and it is very difficult to disregard preconceived ideas about a specific phenomenon [156]. In **studies III and IV** the authors were of different professional backgrounds, representing nursing, occupational therapy, physiotherapy and social work. However, they had all experience of working with older persons. In both **studies III and IV** the authors first read and analysed the interviews separately and then reflected and discussed together until agreement was reached on the category description. In each study two of the researchers conducted the analysis, while the others/third author verified the analysis after listening to all the material. This might strengthen the objectivity i.e. the investigator's ability to be neutral and not colour the data with their own opinions and attitudes [156]. Also, the findings of **studies I and II** were illustrated by quotations, which is another way to enhance the conformability [157].

Using both qualitative and quantitative methods

Traditionally, the quantitative and qualitative research traditions are thought to be incompatible, representing two distinct research paradigms drawing on different methods of data collection. However complex interventions include a number of components usually not so easy to define and the use of solely quantitative methods will not define what the active ingredient(s) are [107]. If the respondents are given the opportunity to highlight their specific priorities, this improves the understanding of the interventions and their different effects [108]. Thus to evaluate both the effect and the understanding of the effect, both quantitative and qualitative methods are needed. This type of evaluation enhances the results of the intervention study and might contribute to further development of effective health-promoting and disease-preventive interventions among older persons.

7.2 Discussion of the results

The evaluation of the three-armed study *Elderly Persons in the Risk Zone* showed that participation in a preventive home visit and senior meetings resulted in postponed morbidity and delayed deterioration in satisfaction with physical and psychological health for up to two years. In addition, both interventions had an effect on frailty, measured as tiredness in daily activities, for up to one year. The senior meetings seem to be the more favourable intervention as significantly fewer participants deteriorated in self-rated

health for up to one year. Finally, neither of the interventions was effective concerning symptoms or frailty measured with eight frailty indicators.

The fact that health-promoting and disease-preventive interventions in the form of PHV and senior meetings succeeded in postponing the deterioration in health and the progression of subjective frailty (measured as tiredness in daily activities) has never been shown before. Previously preventive home visits had shown positive effects in some other areas, for instance, by decreasing hospital admissions, postponing mortality, improving quality of life, reducing nursing home admissions, cutting down the number of falls and delaying functional loss and a decline in self-rated health and ADL [75-77, 158, 159]. As for senior meetings, earlier studies concluded that group education can be useful in supporting sustained changes in health literacy and avoiding behavioural risk factors [160]. The results are very promising as both health and frailty have important implications for older persons' quality of life [161, 162].

Complex interventions include a number of components, which implies that several factors contributed to what might have been the active ingredient. These components may act both independently and interdependently, and the sum of the parts in the intervention has been proven to be greater than the value of each part [36]. Some of these components will be discussed below in relation to the outcomes.

General self-rated health is an important outcome that has been shown to be an independent predictor of mortality [163] and future functional decline [164]. Also, a higher level of self-rated health has been shown to reduce depressive symptoms [165]. Both interventions had an effect on satisfaction with physical and psychological health for up to two years, but only the intervention senior meetings had an impact on general self-rated health, and then only for up to one year. This result might seem contradictory as both instruments measure health. However, self-rated health measured with the single question "in general, would you say your health is …." is more general and incorporates aspects of health information at biological, mental, functional and spiritual levels [166], while the other two questions are more specific and address solely physical and psychological dimensions. This implies that the senior meetings had a good effect on health in a broader sense. An earlier report from the study *Elderly persons in the risk zone* claimed that both a preventive home visit and senior meetings postponed deterioration in self-rated health for three months after the interventions [145]. Thus, the intervention effect of the PHV lasted not more than three months and the effect of the senior meetings lasted up to one year. The

difference between the interventions might explain the advantage of senior meetings.

One difference between the interventions was that the senior meetings were group-based. The group environment in the senior meetings enabled the members to share problems with someone and learn from each other. Previous studies have reported that fellow participants are often seen as credible sources of information [95, 96], and in a group setting, the participants can use their wisdom and life experiences in interaction with the other members of the group [97]. Thus, the group setting may offer older persons an arena where they can express themselves, empowering them to manage their situation and making them feel like experts. The group model also encouraged the participants to share problems with persons in similar circumstances and to discover admirable models to follow among their peers. This approach is similar to peer education, which is a common approach in health-promotion where members of the same age group with similar experiences learn and share health information and health behaviour with each other [94]. The participants in **study IV** expressed that it was inspiring to meet other persons in a similar situation. Older persons who were seen as more healthy and active, especially those who were much older than the average participant and who were still in good shape and healthy, functioned as positive examples. According to Caserta [167], a role model from a similar age group that succeeded in coping with the situation could be successful in terms of health-promotion among older persons. Observing and coaching each other can give inspiration about what is "do-able" even when you have reached a very old age.

Earlier studies of preventive home visits have concluded that more visits have produced a greater effect [7]. Hence, another probable reason for the senior meetings advantage is the duration. The intervention preventive home visit was performed as a single home visit which lasted for about 1.5 to 2 hours, and the intervention senior meeting consisted of four meetings and a follow up home-visit, each lasting for two hours. Given its low intensity, the PHV shows good results and is well suited to those older persons who do not like larger social contexts.

Both the senior meetings and a preventive home visit postponed deterioration in subjective frailty for up to one year (**study II**). The postponed progression of frailty might have several beneficial consequences for the participants. Other studies have shown that tiredness in daily activities is an early indicator of the onset of functional limitations [168], incident disability [169], use of social and health services [170], mortality [123] and lower quality of life

[171]. This result is thus very encouraging. However, neither of the interventions was effective concerning frailty measured as the sum of frailty indicators. This result is in accordance with an earlier publication of the three-month evaluation of the same study [145], showing that all three groups deteriorated at approximately the same pace. Thus, in this sense the interventions were not successful either in the short- or the long -term. Earlier studies of frailty often concentrated on approaches such as high intensity exercise [172], nutritional interventions [173] or pharmacological agents [26]. This poses the question of what might be the active ingredient in these interventions. As frailty measured with tiredness in daily activities is a subjective form of frailty, the interventions in this study affected the experience of being frail rather than the objective aspect, which deteriorated at the same pace in all groups. The experience of being frail might have been affected by several components in the interventions. As a positive effect has been shown to benefit people with both poor health [174] and frailty in a protective manner [175], one probable factor is the positive view that the participants in both interventions had gained of their ageing. This positive view might have influenced the participants to struggle on doing activities despite tiredness. The participants in PHV (**study III)** described that they had previously felt invisible in society, that no one was genuinely interested in older persons, how they managed or about their health status. However, knowing that someone was interested, listened and took time to talk to them about important things made them feel valuable despite their age. Also, the fact that it wasn't too late to do something about their health, heightened the participants' self-esteem and changed their view of being old.

Another ingredient that might have contributed to the positive results is the empowerment approach. To strengthen a person's self-esteem and to empower him/her is an important part of all health-promoting interventions [176]. Although the different professionals' input functioned as an important element of the interventions, a feeling of competence is essential to facilitating a change in health behaviour [177]. This result is also in line with earlier reports on PHV, which suggest that one reason for the positive results of a PHV may be that the older person is taken seriously and participates in decisions concerning his/her own health [84]. A key part of self-efficacy theory is that the stronger the person's belief in his/her own ability, the more likely he/she is to engage in or take actions [178].

The benefit of the interventions to self-rated general health and subjective frailty lasted for one year, which must be considered very encouraging. However, as the results show that it was possible to postpone morbidity and satisfaction with physical and psychological health for up to two years, this

raises the question if it would be possible to improve the impact on the more general health outcome and subjective frailty. Gustafsson *et al*. [179] suggest booster sessions as a way to reinforce the intervention. Booster sessions might be conducted as a follow-up visit after, for example, six months or take the form of a telephone call.

The findings of **study I** show that the participants in all three study groups deteriorated with respect to morbidity during the study period. However, the control group showed a significantly larger deterioration than the intervention groups. In accordance with earlier studies [180], this suggests that it is possible to postpone the progression of morbidity in older persons. These findings are consistent with both the theory of "expansion of morbidity" [18] and the theory of "compression of morbidity"[19] and implies that older persons do become more diseased with time, but that it is possible to postpone this decline with health-promoting and disease-preventive interventions. This could mean fewer years in the fourth age, which in turn can mean savings for both society and the person involved. One possible explanation for these positive results might be the preventive approach that was mediated during the interventions. Sherman *et al*. [181] found that over 40% of the 75-year-old persons interviewed in their study reported problems with knowledge and understanding of their own health, which implies that older persons need much more information about health and self-care. Chou & Wister [182] found that the chances of making a behavioural change doubled when appropriate knowledge was received, and knowledge was also an important tool for triggering self-care behaviour. The participants in **study IV** stressed the importance of receiving information that was broad and came from different professionals, as it contributed to a greater awareness and understanding of different aspects of ageing. In accordance with this finding, a recent literature review shows that a multi-dimensional programme requires a diversity of professionals in order to be effective [10]. The authors concluded that the different professionals probably had their own way of "framing the problem", which means that a multi-professional approach is desirable in view of the complexity of health-promotion and disease-prevention among older persons.

The results of **study I** show that neither of the interventions had an effect on symptoms. As it is possible to misjudge symptoms as signs of ageing, symptoms might be difficult to influence. Also, it is possible that both interventions made the participants more aware of their symptoms, or that merely by asking the participants about their symptoms the researchers altered the phenomenon itself [114]. Our measure of symptoms makes it impossible to measure the intensity or to what degree the symptoms cause

distress, both of which are important dimensions when evaluating symptoms. These factors affect the experiences of the symptom, which may vary a great deal [53]. One programme that has been shown to be effective with respect to symptoms such as fatigue, shortness of breath, pain, social activity limitation, depression, and health distress incorporated skills mastery, reinterpretation of symptoms and modelling [100]. Further evaluations are needed to examine what might influence symptoms, and what interventions are suitable.

The overall finding in **study IV,** but it was also evident in **study III,** was that the participants involved in the interventions lived in the present and they expressed that they found it difficult to assimilate information that was not considered to be of immediate interest. Similar results were reported earlier among those receiving a preventive home visit [183]; they felt that they did not need the PHV and that the PHV came too early. However, it has been shown that interventions targeting older persons in an early or reversible stage of frailty have led to more positive results than those targeting older persons whose functional decline is more advanced [184]. Hence, one challenge for health care professionals is to motivate older persons that are healthy and independent to engage in health-promoting and disease-preventive activities.

The findings of **study III** and **IV** that the older persons lived in the present are consistent with those described by Nilsson *et al*. [185], who found that an interruption in the continuity of the ageing process, such as trauma or illness, rather than age itself, could initiate experiences of feeling old. The fact that older persons live in the present may be due to a concern that the changes occurring in old age are expected to be a threat to their health. In a ethnographic study of ageing, Alftberg [186] concluded that ageing and old age were experienced as synonymous with health risks. Furthermore, she argues that the categorisation of older persons into a group associated with health risks affects how they understand themselves and the world, their thinking and actions. The fact that older persons are considered to be at risk thus implies that these persons think of themselves in terms of health problems. Thus to take one day at a time might be an adaptation strategy among older persons [187]. Interviews of 85-year-olds showed that they did not plan ahead but took one day at a time in order to be able to experience some form of control over their lives [188].

To understand older persons' decisions about health, the trans-theoretical model (TTM) [104] may be used to assess a person's readiness to act upon health advice. Living in the present can be understood as the first stage of TTM. The first stage is called pre-contemplation and is characterised by not

believing that there is a problem and not being interested in any kind of help. This may be because they have not yet experienced any negative consequences of old age, or it may be a result of denial. When working with interventions to promote health, it is important to evaluate a person's readiness for change, it can appreciate what barriers to expect [189]. Despite the fact that the participants in the interventions lived in the present, the positive effects on health and frailty indicate that both interventions were effective in motivating older persons to engage in a health- promoting behaviour.

The results of study **IV** show that, despite living in the present, or because they lived in the present, the participants experienced the senior meetings as a key to action. The senior meetings had aroused an interest in things that the participants had not previously thought about or acted upon. Similar findings were evident in **study III,** where the participants expressed that the preventive home visit had generated motivation to start engaging in different health-promoting activities in order to prevent health problems that could arise later. According to the Health Belief Model (HBM), which is a model developed to predict people's health behaviour [101], there are two different types of triggers that can produce actions by a person: external triggers (such as advice, mass media or increased awareness) and internal triggers (such as morbidity or symptoms). Given this, we could assume that if it had not been for the interventions, the participants would not have engaged in health-promoting activities until they experienced a decline in health or increase in frailty. Thus, the interventions functioned as triggers to engage in health-promoting activities. When adding the TTM to this result, it can be interpreted that a key to action means that the participants were pushed into the second step of the trans-theoretical model of change, which is contemplation. Contemplation means that the person involved is becoming aware of the benefits of making a behavioural change, is seeing solutions and is planning to take action [104].

Taken together, these complex interventions consist of many interacting factors. Those factors that were described by the participants were the holistic information that was mediated by using different professionals and group interaction, the fact that participants were strengthened in their role as older persons, that someone cared about older persons health and the fact that the interventions focused on personal needs. In addition, the senior meetings contributed to a supportive environment where the participants could learn from each other, gain role models and share problems with others. Together these factors might have contributed to an increased understanding and

ability to use their own resources and may have motivated them to take measures and engage in health-promoting activities (figure 4).

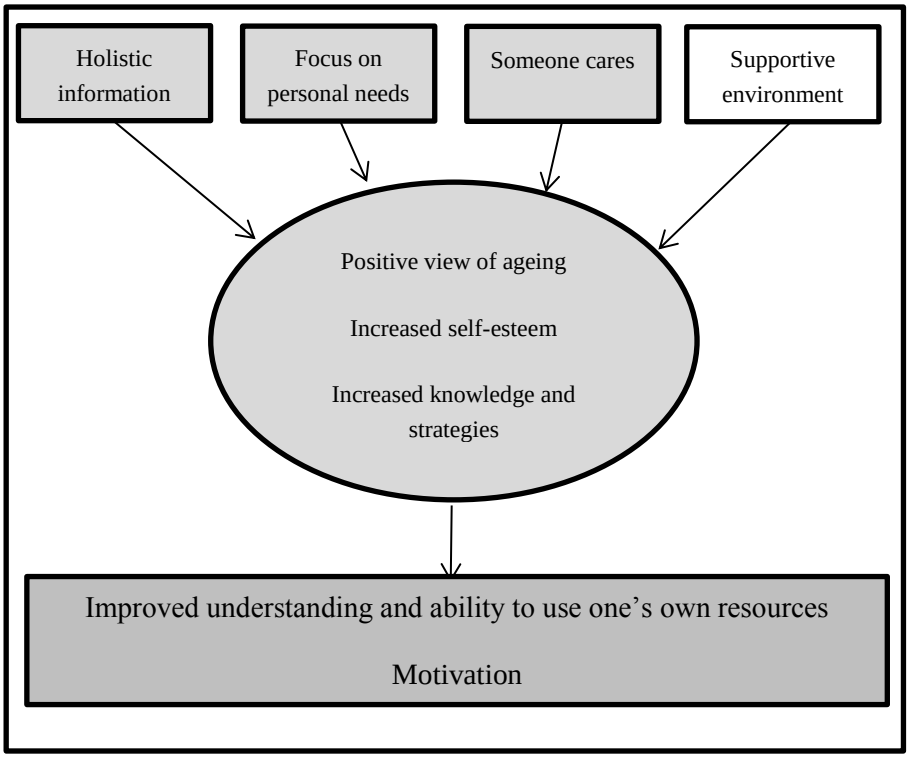


Figure 4. The interpretation of the active ingredients in the preventive home visit and the senior meetings. The white box only applies to the senior meetings.

8 CONCLUSION AND CLINICAL IMPLICATIONS

In conclusion the studies in this thesis show that it is possible to postpone a decline in health and a progression of subjective frailty in older persons. Both the intervention preventive home visit and the group-education senior meetings showed favourable effects. The intervention senior meetings were able to postpone a decline in health in a broader sense and were therefore the most beneficial intervention.

Despite these positive findings, this thesis suggests that one challenge for health care professionals is to motivate older persons that are healthy and independent to engage in health-promoting and disease-preventive activities. However, both interventions were successful in that sense. The contributing factors were the holistic information that was mediated by using different professionals and group interaction, the fact that participants were strengthened in their role as older persons, that someone cared about their health, and the fact that the interventions focused on personal needs. In addition, the senior meetings contributed to a supportive environment where the participants could learn from each other, gain role models and share their problems, which might also have contributed to it being the most beneficial intervention. Altogether this could have increased the participants' understanding and ability to use their own resources and may have motivated them to take measures and engage in health-promoting activities.

Thus, both interventions might contribute to more healthy years in old age. This requires that health-promotion and disease-prevention for older persons are integrated into all health-care provision. The knowledge gained from this thesis may contribute to the larger jigsaw puzzle of setting up health-promoting interventions targeting very old persons. The following factors were shown to be important when doing so:

- A multi-professional approach where persons from different professions work together mediates a broad spectrum of information

- The group model can function as a way of empowering the participants giving them role models and a sense of sharing problems with persons in similar circumstances.

- The group model can facilitate peer learning, which facilitates motivation and takes advantage of the wisdom and life experiences of older persons.

- A focus on personal needs and an empowerment approach can strengthen the participants self-esteem and self-efficacy

- The fact that someone cares about older persons health and well-being, together with information implying that it is never too late to do something about health, can give the older persons a more positive view of ageing.

9 FUTURE PERSPECTIVES

The knowledge gained from this thesis point to several areas that require further research.

- Economic evaluations are important to be able to prioritise between different interventions. Several evaluations have been made regarding preventive home visits, but none have been made of senior meetings. Thus, a health economic evaluation looking at costs and utility is an urgent necessity as it can help to determine whether to implement these interventions.

- As the general educational and income levels of residents of the two urban districts included in this thesis were somewhat better and their sickness rate somewhat lower than in Gothenburg as a whole, the interventions need to be evaluated in another setting to be able to generalise the results to a broader clientèle. During the time this thesis was written, a study evaluating the interventions preventive home visits and the senior meetings among immigrants in Sweden has been in progress.

- As proposed by Gustafsson *et al*. [179], booster sessions or a follow-up telephone call to the participants in the intervention might augment the effects on the subjective outcomes that lasted for up to one year. This idea is of interest for further investigation, to see if it is possible to reinforce the interventions.

- Another aspect that would be interesting is to investigate which participants benefitted most from the interventions. What age, sex, morbidity level, health status and so on, did the ones who benefitted most have. This could augment the knowledge gained from our studies and improve the efficacy of the interventions

- Since neither of the interventions was effective when it came to postponing the progression of symptoms, this aspect needs to be further elaborated. Further evaluations are

needed to determine what might influence symptoms and what interventions are suitable.

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