Chapter 1
Introduction
INTRODUCTION

As in other countries, the population of the Netherlands is aging. The number of Dutch people aged 65 years or older will increase from approximately 2.2 million, 13.7% of the total population in 2002, to approximately 3.8 million, 21.5% of the total population, by 2030. Approximately 88% of individuals older than 65 have at least one chronic health limitation and a number of older adults suffer from impaired functioning or well-being. Old age and disablement are the main determinants of health care use, and health issues regarding the older population are becoming increasingly important. As a consequence, the national health objectives for older people target increasing the number of years of healthy, independent life and reducing limitations in activities of daily living (ADLs).

Ageing is characterised by a diminished function in multiple physiological domains, including muscle strength, neuromuscular coordination, balance, and cardiovascular function. The cumulative effect of these diminished functions is a reduction in physical reserve. Physical reserve is the physiological capacity in excess of that needed for daily activities and provides a margin of safety that absorbs age- or disease-related changes without a loss in function. As physical reserve deteriorates, individuals approach a threshold of independence, below which any further loss of capacity is associated with a 17-fold to 20-fold decrease in physical function. When physical capacity falls below the ability required for the performance of daily tasks, functional limitations and a loss of independence may occur. Ultimately, loss of physical reserve can lead to institutionalisation, morbidity, and mortality.

Physical capacity starts to decline in the fourth decade, whereas the prevalence of disability starts to decrease markedly only after the age of 75 years. The delay between the start of the loss of function and the loss of physical capacity is attributed to the physical reserve. Williamson and Fried observed that in the early stages of physical decline people adopt modification strategies to cope with the demands of independent living, e.g., cooking fewer meals or using only a limited part of their home. Modification strategies can probably forestall disability for a period of time. Reserves depleted below the level required for daily tasks will lead to limitations in the performance of functional tasks, such as walking, stair climbing, rising from a chair, housekeeping and shopping.
In the Netherlands, approximately 20% of people between 65 and 75 years of age report problems with ADLs, a proportion which increases to 48% in people older than 85. Climbing stairs, shopping, rising out of a chair or bed, house cleaning, washing and dressing oneself are the first ADLs to be affected. Each year about 10% of non-disabled community-dwelling adults, aged 75 or older, lose their independence. The loss of independence results in a decreased quality of life and is the most distressing aspect of ageing for many older adults. Limitations in physical function of a growing segment of the population herald an increased expenditure for health care and long-term care systems.

Understanding the factors that cause the decline in independence is necessary for designing successful interventions. The decline is partly caused by the ageing process and is accelerated by a sedentary lifestyle and disease. The working capacity of sedentary individuals has been shown to decrease by 30% between the ages of 30 and 70 years, with half of this decrease being due to disuse and the other half to ageing.

Ageing is accompanied by a loss of skeletal muscle mass, alterations in muscle quality, postural hypotension, deterioration in joint mobility and neuromuscular coordination, and deterioration of the cardiovascular and respiratory systems. While ageing is an irreversible process, the effect of a sedentary lifestyle is not in most people.

Although the benefits of regular physical activity have been well documented, most adults in developed countries do not exercise. For example, only 24% of the Dutch population aged 55 years or older engage in 30 minutes of moderate physical activity 5 or more days per week, 30% are semi-active, and 46% report no leisure physical activity. Women report the least regular physical activity of all demographic groups.

Participation in a regular exercise programme is considered to be an effective strategy to reduce or prevent functional decline with ageing. Older people can improve muscle strength, maximal force, power, and rapid force development by resistance training. Solid evidence is available regarding the positive effects of exercise on flexibility, aerobic capacity, balance, gait, and bone, and in reducing the risk of falls and fractures. In addition to these effects, exercise can also provide a diversion from daily routines and stress, with a positive effect on feelings of enjoyment, companionship and accomplishment.
However, there is less certainty about the effect of exercise programmes on the performance of ADLs. Resistance strength training is the type of exercise mostly used in trials in older adults, but an increase in strength is not necessarily converted into an effect on ADL. Systematic reviews have failed to find strong and consistent evidence supporting a beneficial effect of exercise in general on daily activities, disability and health-related quality of life (HRQOL). In addition, it is still unclear whether the effects of exercise interventions are sustained for a long time after completion of an exercise programme. The lack of evidence for the effect of exercise on functional tasks may have several causes. Methodological limitations, such as lack of a control group, no randomisation or a small sample size, may influence the results of studies. The diversity of exercise programmes makes it difficult to determine whether a strategy is effective and which type of exercise is most effective in terms of performance of daily tasks. A wide range of exercises has been tested for effect on functional performance, including resistance strength training, exercises to improve balance, aerobic functions or stretching and flexibility capacity; however, most exercise interventions aim to enhance functional tasks by improving just one function, mostly muscle strength, flexibility, or balance. The performance of functional tasks, however, is complex and involves an interplay of cognitive, perceptual and motor functions, and is closely linked to the individual’s dynamic environment. To achieve the greatest effect, exercise training should simulate, as closely as possible, the conditions of daily tasks. The American College of Sports Medicine recommends a frequency of training of 3-5 times per week, intensity of training 60-90% of maximum heart rate, or 50-85% of maximum oxygen uptake or maximum heart rate reserve, duration of training 20-60 minutes, dependent on the intensity, for developing and maintaining cardiorespiratory fitness, body composition and muscular strength and endurance in healthy adults. Adherence to these recommendations would help to improve the comparability of intervention studies.

Finally, when collecting data it is vital to establish exactly what question(s) is (are) have to be answered, because this determines the appropriate data to be collect. Studies of the effects of exercise on physical functional performance have often focused on selected intermediate outcome measures, such as muscle strength, balance and gait, instead of functional performance. Yet other studies have assessed the performance of daily activities with self-report based
questionnaires, but such instruments lack sensitivity to change in relatively healthy subjects. As a result, insufficient information is available to ascertain whether exercise training can reduce or delay dependency in performing daily tasks in community-dwelling older people.

Therefore, alternative outcome measures should be incorporated in exercise studies that aim to improve physical functional performance. Also, the mechanisms that underlie successful initiation and adherence to exercise programmes are not well understood.

The aims of the study
The aim of the studies described in this thesis was to study the difference in effect between functional tasks exercises and resistance strength exercises on the functional performance and quality of life of older community-dwelling women. Specific research questions were:
1. To evaluate the feasibility of a new functional tasks exercise programme, designed to improve functional performance of community-dwelling older women, by comparing it with a resistance exercise programme (chapter 2).
2. To determine the intra-examiner reliability and construct validity of the Assessment of Daily Activity Performance (ADAP) test in a community-living older population, and to identify the importance of tester experience (chapter 3).
3. To determine whether a functional tasks exercise programme and a resistance exercise programme have different effects on the ability of community-living older people to perform daily tasks (chapter 4).
4. To determine whether a functional tasks exercise programme and a resistance exercise programme have a different effect on the health-related quality of life (HRQOL) of community-dwelling older women (chapter 5).
5. To discuss the differences in participants' satisfaction between a functional tasks exercise programme and a resistance exercise programme, and to explore the impact of participants' satisfaction and health-status on exercise compliance and effectiveness of the two programmes (chapter 6).
REFERENCES


31. CBS Vademecum of Health Statistics of the Netherlands 1999


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