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## **LEISURE IN LATE LIFE**

# **Patterns of Participation and Relationship with Health**

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To my parents



## ABSTRACT

The overall aim of this thesis was to investigate aspects of leisure participation in late life. More specifically, differences in participation rates between two cohorts of older adults and changes in leisure activities from middle age to old age were examined, as well as the association between leisure activities and survival. All studies used nationally representative data from the Level of Livings Surveys (LNU) and SWEOLD studies, which together comprise a longitudinal database where individuals have been followed from 1968 to 2004.

Forecasts have suggested that coming cohorts of older adults will be more active and resourceful than earlier cohorts. In line with this proposition, Study I showed that older individuals in 2002 were more engaged in leisure activities than their predecessors ten years earlier. The higher level of leisure participation was not due to improvements in health, since health status was worse in the more recent cohort.

Despite the late-life transitions of retirement, bereavement and disability, individuals seem to preserve patterns of habits and activities with increasing age. Study II followed individuals over a 34-year period with regard to participation in different leisure activities. Although participation levels declined for the group as a whole, individuals maintained their activities to a large extent. Activities in middle age were more important than late-life functional ability in predicting leisure participation in old age. Thus, although there is considerable variation between individuals and activities, participation in old age is often a continuation of earlier participation.

Positive effects of activities on well-being, health and survival have been reported. Studies III and IV investigated the association between activities and survival among older individuals. In Study III, people aged 65 and older and participating in only a few activities had a doubled mortality risk compared to those with the highest participation levels, even after controlling for age, education and health indicators. Women benefited more from activities involving social interaction, while men seemed to benefit from solitary activities.

As late-life leisure activities seem to be a continuation of earlier habits, late-life benefits of activities may be due to earlier participation. Thus, Study IV examined the health associations with both earlier and recent activities. Individuals were followed for twenty years until the age of 77 or older. Recent and earlier participation in activities were analyzed with regard to four-year mortality. Stronger associations were found between recent leisure participation and survival, especially for men. Results remained after controls for age, education, health indicators, changes in health status, and lifestyle. Among women, earlier participation in activities involving social interaction was associated with a lower mortality risk. While men seemed to benefit from recent leisure participation in line with the disuse hypothesis, women benefited from earlier participation, supporting the reserve hypothesis.

The expanding leisure pursuits of new cohorts will increase demands on authorities and organizations to provide opportunities for activity participation and to address accessibility issues. Considering the accumulated evidence suggesting health benefits from activities, especially physical and social activities, health promotion programs targeting middle-aged and older individuals may be worthwhile.

Keywords: leisure activities, participation, middle age, old age, Sweden, longitudinal

# SAMMANFATTNING

Det övergripande syftet med denna avhandling är att undersöka olika aspekter av äldre människors fritidsaktiviteter. Samtliga delstudier gjordes på riksrepresentativa data från Levnadsnivåmaterialet (LNU) och SWEOLD-studierna, som tillsammans utgör en longitudinell databas där individer har följts från slutet av 1960-talet och fram till idag.

Äldre människor är olika och morgondagens äldre förväntas skilja sig från dagens äldre på olika sätt. Den första delstudien undersökte skillnader avseende fritidsaktiviteter mellan två kohorter av äldre personer. Studien visade att de äldre 2002 deltog i fritidsaktiviteter i större utsträckning än vad motsvarande åldersgrupper gjorde tio år tidigare. Den högre aktivitetsnivån berodde inte på förbättringar i hälsan eftersom hälsotillståndet var sämre i den senare kohorten.

I den andra delstudien undersöktes förändringar i aktiviteter från medelåldern till ålderdomen. Trots olika förändringar som ofta kommer med åldrandet, såsom ökad förekomst av sjukdomar och funktionshinder, tycks individer bevara sina aktiviteter och vanor med stigande ålder. Deltagandet i fritidsaktiviteter på äldre dar visade sig ha starkare samband med vilka aktiviteter man ägnat sig åt i medelåldern än med funktionsförmågan som äldre. Även om det är stor variation mellan olika individer och aktiviteter, tycks aktiviteter i ålderdomen ofta vara en fortsättning av tidigare deltagande.

Aktivitetens positiva samband med välbefinnande, hälsa och överlevnad har påvisats i flera tidigare studier. Studier som även inkluderar de allra äldsta är dock få. De tredje och fjärde delstudierna undersökte sambandet mellan fritidsaktiviteter och överlevnad bland äldre individer. Studie III analyserade deltagande i olika typer av aktiviteter bland individer, 65 år och äldre, med avseende på överlevnad. Uppföljningstiden var tolv år. Resultaten visade att äldre personer som bara deltog i ett fåtal aktiviteter hade en dubbelt så hög dödsrisk under studieperioden jämfört med dem som deltog i ett flertal aktiviteter. Marginaleffekten avtog dock, deltagande i fler än sex aktiviteter minskade inte dödsrisken ytterligare. Resultaten kvarstod efter att hänsyn tagits till ålder, utbildning och olika hälsoindikatorer i analyserna. För kvinnor var sambandet med överlevnad starkast för aktiviteter som utförs tillsammans med andra, t.ex. föreningsaktiviteter och deltagande i studiecirklar. Sambandet mellan aktiviteter och överlevnad var för männen starkast vid aktiviteter som ofta utförs på egen hand, såsom trädgårdsarbete och hobbyaktiviteter.

Eftersom äldre personers aktiviteter ofta är en fortsättning av det de tidigare gjort, kan sambandet mellan aktiviteter och hälsa i hög ålder i själva verket bero på tidigare deltagande. Det kan vara så att aktiviteter i ålderdomen spelar marginell roll efter att man tagit hänsyn till tidigare aktiviteter, eftersom individer genom långvarigt deltagande antas kunna bygga upp en reservkapacitet. Många fritidsaktiviteter kan bredda individens sociala nätverk och därmed tillgången till socialt stöd, framförallt om dessa pågår en längre tid, vilket i sin tur kan ha hälsoeffekter. Alternativt

kan vissa aktiviteter vara ”färskvara” och således bara påverka hälsa (och överlevnad) så länge de utövas. Den fjärde delstudien analyserade effekterna av såväl tidigare som nuvarande aktiviteter. Individer följdes över en 20-årsperiod tills de var 77 år eller äldre. Nuvarande och tidigare aktiviteter analyserades med avseende på överlevnad. Uppföljningstiden var fyra år. Sambandet mellan nuvarande aktiviteter och överlevnad var starkare än sambandet med tidigare deltagande, framförallt bland män. Tidigare deltagande i aktiviteter tillsammans med andra var dock relaterat till en lägre dödsrisk bland kvinnor. Resultaten kvarstod efter kontroll för ålder, utbildning, hälsa, hälsoförändring och livsstil.

Resultat från studier om aktiviteter och hälsa, framförallt när studiepopulationen består av äldre individer och utfallet är överlevnad, måste tolkas med försiktighet. Detta på grund av att aktiva individer på flera sätt kan tänkas utgöra en selekterad grupp. Dels kan de vara friskare till att börja med och dels kan de av andra skäl, såsom högre socioekonomisk status och större tillgång till resurser av olika slag, ha bättre förutsättningar att leva länge.

Sammanfattningsvis visar dessa resultat, i likhet med många tidigare studier, att det finns ett samband mellan fritidsaktiviteter och hälsa och överlevnad bland medelålders och äldre individer. Det är därför viktigt att underlätta individers deltagande i samhällslivet och undanröja hinder för social och fysisk aktivitet.

Nyckelord: fritidsaktiviteter, deltagande, medelåldern, äldre, Sverige, longitudinell





## LIST OF ORIGINAL PUBLICATIONS

This thesis is based on the following original papers, referred to in the text by their Roman numerals:

- I. Agahi N, Parker MG. Are today's older people more active than their predecessors? Participation in leisure-time activities in Sweden in 1992 and 2002. *Ageing & Society* 2005;25(6):925-941.
- II. Agahi N, Ahacic K, Parker MG. Continuity of leisure participation from middle age to old age. *Journal of Gerontology: Social Sciences* 2006;61B(6):S340-S346.
- III. Agahi N, Parker MG. Leisure activities and mortality: Does gender matter? (Submitted).
- IV. Agahi N, Silverstein M, Parker MG. Do benefits of leisure activities accumulate from middle age to late life? The effects of recent and earlier participation on survival. (Submitted).

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# 1 INTRODUCTION

As the population shifts demographically, more and more people survive to older ages. Increasing life expectancy and higher expectations of a good quality of life in old age highlights the importance of maintaining an active lifestyle in later life. Health behaviors such as physical activity, smoking, alcohol consumption and food habits are well-known lifestyle factors that influence aging, health and survival. In recent years, an active leisure time has increasingly been acknowledged as a factor that protects against (or at least postpones) many of the ordeals and impairments associated with old age, including death.

## 1.1 WHY STUDY LEISURE ACTIVITIES?

Leisure time, no matter what is done with it, is an essential part of human life and development, and as such deserves closer study. As life expectancy increases, most people can expect more years of healthy and independent life after retirement. Leisure activities, therefore, become a more important part of older individuals' lives. Furthermore, studies suggest that more recent cohorts of older adults, such as the baby boom generation, differ from previous cohorts with regard to opportunities and resources earlier in life that will affect habits and behaviors in old age (Huber & Skidmore, 2003). In addition, recent societal changes have resulted in a greater variety of cultural activities, travel destinations, cafes and restaurants, which in turn affect the opportunity for late-life leisure involvement.

Sweden has a tradition of active organizational engagement which has been an influential factor for social cohesion and solidarity. The trade unions have been an integral part of Swedish social life during working years, as have retirement organizations after retirement. Study circles, for learning foreign languages, handicrafts or other subjects, have been popular since the 1950s. Several organizational movements have expressively sought to promote public health, for example the temperance movement struggling to reduce alcohol consumption and the labor movement fighting for better working conditions.

Leisure activities are considered part of a healthy lifestyle, and many advocates of late-life leisure participation propose that there are health benefits to be gained. Our understanding of the nature of these benefits is still limited. For example, one question is whether health effects from leisure activities accumulate over time, or if positive effects are only maintained as long as the activity is upheld. Many have speculated that lifelong leisure participation and social integration may entail greater effects on disease prevention and longevity (Bassey, 2000; Fratiglioni, Paillard-Borg, & Winblad, 2004; Klumb & Maier, 2007), but few studies have investigated the issue. Different activities may of course have different potential for health benefits and for immediate and cumulative longitudinal effects. The possible health benefits of leisure participation may also differ for men and women, during different stages of the life course, and for different cohorts of elderly people.

## **1.2 PUBLIC HEALTH POLICY AND THE OLDER POPULATION**

In recent years, more and more attention has been focused on the older population. The Swedish National Institute of Public Health has identified four “cornerstones for aging well”: physical activity, good eating habits, social interaction/support and engagement in meaningful activities. Three of four factors are related to leisure activities, which further emphasizes the importance of leisure activities in old age. These four cornerstones have been investigated with regard to their potential for health promotion in the older population. As older adults are such a diverse group, ranging from the newly retired to centenarians, from those in full physical and cognitive health to the very frail, health promotion efforts must be tailored to the targeted group (Agahi et al., 2005). In a European context the importance of older adults’ active participation in the community is highlighted by the Healthy Ageing project. Prioritized areas include interventions to reduce social isolation and loneliness among the elderly and the provision of opportunities for volunteer work (Swedish National Institute of Public Health, 2007).

Some consider health to be the responsibility of each individual. Still, the state, municipalities and social institutions can in many ways facilitate the maintenance of good health by creating supportive environments that promote health and healthy behaviors. Particularly in the older population, inadequate accessibility and availability can become overwhelming barriers. The role of the environment in constructing disability has been increasingly acknowledged in recent years, particularly through its introduction in the International Classification of Functioning, Disability and Health (ICF) (Schneidert et al., 2003). Environmental factors can both create barriers and support and facilitate participation, and are thus a significant aspect of the everyday lives and leisure pursuits of older individuals.

## 2 AIMS

The overall aim of this thesis is to investigate different aspects of leisure participation among older individuals. Studies I and II describe participation in leisure activities over time, both changes between different cohorts of older people and changes within aging individuals. Studies III and IV examine the association between participation in leisure activities and survival among older individuals.

The specific aims of the papers were to examine:

- (1) correlates of leisure participation among older individuals (aged 77 and older) (Study I)
- (2) differences and similarities in the level of leisure participation between two different cohorts and time points (i.e., possible period effects) (Study I)
- (3) changes in different kinds of leisure activities in aging individuals from middle age to old age, from the perspective of continuity theory (Study II)
- (4) the association between leisure activities and survival among older individuals (aged 65 and older) (Study III)
- (5) differences and similarities between older men and women in the association between leisure activities and survival (Study III)
- (6) the effects of both earlier and recent leisure activities on survival among older individuals (aged 77 and older), thereby investigating the disuse and reserve (or cumulative advantage and disadvantage) hypotheses (Study IV)

## 3 LEISURE ACTIVITIES AND AGING

### 3.1 THEORETICAL PERSPECTIVES ON ACTIVITIES AND AGING

#### 3.1.1 Disengagement theory

In the early 1960s, the disengagement theory of aging was set forth by Cumming and Henry (1961). Disengagement theory is considered the first “real” gerontological theory (Achenbaum & Bengtson, 1994). According to this theory, aging is associated with a process of mutual disengagement between the individual and society. The disengagement process is considered an inevitable part of aging, through which the individual distances himself/herself from society, its institutions and members. The social relationships that do remain are altered in quality. Often, disengagement is initiated through loss of roles, declines in abilities or sudden awareness of the proximity to death. At the same time, societal forces also play a role in the disengagement process through social systems and institutions such as retirement. According to the advocates of disengagement theory, this withdrawal is beneficial and functional both for society and the individual.

From the individual’s perspective some disengagement is forced, such as disengagement because of retirement, declining physical and mental abilities or reduced financial resources. Other disengagement may be voluntary due to changing preferences, though declining abilities and resources may of course alter preferences. However, according to Cumming and Henry, age is the primary factor affecting the level of disengagement. This has been criticized as the theory thus fails to account for external factors such as health, personality and lifestyle; factors that may be more important to disengagement than chronological age (Lipman & Smith, 1968; Maddox, 1964). Others have argued that it may not be age *per se* that causes disengagement, but rather the effects of social and physical stress (due to retirement, widowhood or poor health, for example) that accumulate in old age and thus redirect the pattern of engagement (Tallmer & Kutner, 1969).

Disengagement was considered to be appropriate and satisfying for older individuals. Individuals with higher levels of disengagement were thought to experience a higher level of life satisfaction; at least this was how the theory was interpreted. The theory was widely criticized and there was not much empirical evidence to support it. Much of the criticism concerned the theory’s universality and functionality, as studies found more diversity than uniformity in post-retirement roles and activities across different groups (Bengtson, Chiriboga, & Keller, 1969). Furthermore, positive relationships between disengagement and life satisfaction could not be verified in other populations, such as among the poor, minority groups or those in poor health (Lipman & Smith, 1968). Cumming later expounded the theory to clarify some common misconceptions (Cumming, 1975). First, she argued, the concept of disengagement had been misunderstood as loneliness and isolation, which was not the intention of the theory. Furthermore, the issue of the association between disengagement and life satisfaction was irrelevant and should not be addressed until the theory’s utility had been verified. Finally, the theory only related to



“normal” aging and was therefore not applicable to the sick and poor. Despite these clarifications, disengagement theory is now largely discounted.

Years later the theory of gerotranscendence, in part building on the disengagement theory, was formulated by Tornstam (1989; 2005) as a response to the simplified dichotomy between disengagement and activity (see below). Gerotranscendence is considered an active process of detachment, instead of the passive withdrawal suggested by disengagement theory. During the process of gerotranscendence the concepts of time, space, life and death are redefined. The older individual’s perspective is moved from materialistic and rational views of the world to a more transcendent view. Thereby the individual becomes less self-centered and less interested in social activities, while feeling more connected to past and future generations as well as a cosmic union with the spirit of the universe. This theory has not been widely tested.

### **3.1.2 Activity theory of aging**

The activity theory of aging appeared partly as a response to disengagement theory. Although the idea of activity theory appeared in gerontological literature already in the 1950s (Havighurst & Albrecht, 1953) stating that there is a direct relationship between activity and life satisfaction in old age, it was not formally and explicitly formulated until after the introduction of disengagement theory (Lemon, Bengtson, & Peterson, 1972). Activity theorists claim that it is important to uphold activity levels and replace lost activities and roles in order to maintain life satisfaction, especially in the face of different kinds of losses (for example, functional losses or widowhood). Although the authors themselves found little empirical support for the theory, it was replicated more successfully by others a few years later (Knapp, 1977; Longino & Kart, 1982).

Several studies, including that of Lemon and colleagues, reported exceptions to this theory (Lemon et al., 1972; Maddox, 1963). Lemon and colleagues pointed to some limitations in the formalization of activity theory, one of the most important being the disregard of the individual’s previous lifestyle and personality patterns. They concluded that activity theory may be too simplistic and inadequate to capture the complex interaction between the individual and the social system: “The process of growing old involves a complex interchange between the individual, who carries with him a set of experiences and expectations, and his social world . . . To assert that activity in general is predictive of life satisfaction in general is to obscure the nature of this complex system.” (Lemon et al., 1972, p. 520). They also emphasized the heterogeneity of old age and the aging process, and the difficulty of capturing all relevant aspects in a general theory.

### **3.1.3 Continuity theory of aging**

The continuity theory of aging was formulated in the late 1980s by Robert Atchley (1989), although both he and others had observed the phenomenon of continuity in behaviors and activities much earlier (Atchley, 1971; Maddox, 1968). Continuity theory is described as “a theory of continuous adult development, including adaptation to changing situations” (Atchley, 1999, p. 1). It is a theory about adaptation. According to continuity theory, most older individuals are coherent in their ways of

thinking, activity participation and relationships as they age. Maintaining continuous patterns is the most common strategy for adaptation to aging and the life transitions commonly associated with aging, although not the only one.

Although aging does not necessarily lead to declines in health and function, it usually involves many transitions. Retirement, bereavement and restrictions in the body's reserve capacity all affect the pursuits of daily life, social network, priorities and time use. In contrast to activity theory, continuity theory does not relate continuous patterns over time to certain outcomes such as well-being or successful aging; people who do not display continuous patterns may very well experience successful aging and vice versa (Atchley, 1989, 1999). Nevertheless, adaptive strategies have been shown to help maintain life satisfaction, even when faced with disability (Atchley, 1998), and many individuals seem to pass through the transitions of retirement or widowhood with maintained levels of morale and activity despite the role loss (Atchley, 1999). In some cases, maintaining continuity may not be a realistic alternative considering the life transitions that occur. The vain struggle for continuity can in such cases have negative consequences and be maladaptive (Atchley, 1999).

Continuity is a fairly flexible concept here, referring to the persistence of general patterns rather than identical 'sameness' and stability over time; in fact, continuity and change are proposed to be simultaneous processes that coexist. An individual can continue participation in the same interest sphere, only changing the expression of activity. So, for example, someone who has been engaged in cross-country running may later engage in brisk walking. With regard to activity participation, individuals who participate in the same activities with the same frequency over time show *stability*, while those who participate in the same activities but to a slightly lower or higher extent show *continuity*. *Discontinuity* is displayed by those who cease or start several activities over time (Atchley, 1999).

Continuity theory has been exposed to remarkably little critique. The points that have been raised relate to the theory being too broad and that maintaining continuity through life transitions such as the onset of disability or death of loved ones is nearly impossible (Becker, 1993; Covey, 1981).

### **3.1.4 Selective optimization with compensation**

Along the same lines as continuity theory is the model of selective optimization with compensation (SOC) suggested by Baltes and Baltes (see for example Baltes, 1997; Baltes & Baltes, 1990). This model describes a general process of adaptation, used across the life course. However, in late life its dynamics change and it takes on new meaning due to decreasing reserve capacity. According to the model of selective optimization with compensation, individuals use these three adaptive strategies to maintain continuity as they get older. *Selection* refers to the choices and priorities individuals make when they must restrict their activity due to losses in function or resources. *Optimization* refers to engagement in activities that stimulate body and mind in order to increase the reserve capacity needed to continue participation. Finally, the individual uses *compensating strategies* in order to continue engaging in the

chosen activities despite reductions in or losses of capacities. The use of technology such as hearing aids or palm pilots can help compensate for impaired functions and thereby make it possible to continue participation in desired activities.

Due to extensive inter-individual differences in late life, the application of these strategies varies greatly for different individuals. Some may primarily use selection and optimization strategies, as reported by studies showing decreasing diversity of social relations and activities and a narrowing of the social network toward its core over time (Avlund et al., 2002; van Tilburg, 1998), while others focus on optimizing and compensating strategies without giving up activities (Gignac, Cott, & Badley, 2002).

### **3.1.5 Life course theory**

The roots of the life course perspective can be dated back to the 1920s (Thomas & Znaniecki, 1920), but it was not until the 1960s that researchers made more serious attempts to understand “how people lived their lives in changing times and across various contexts” (Elder, Johnson, & Crosnoe, 2003, p. 4).

Five general principles make up the foundation of life course theory (Elder et al., 2003):

1. *The principle of life-span development*, according to which human development and aging take place over the entire life course rather than being limited to certain periods of life. Old age is often shaped by earlier life habits and conditions.
2. *The principle of agency*, according to which individuals are active in the construction of their own life course, within the limits of socio-historical opportunities and boundaries.
3. *The principle of time and place* signifies the embeddedness of individuals within the context of historical time and place. Individuals and cohorts are shaped by various circumstances throughout the life course; depending on where and when events occur, effects will differ for different cohorts.
4. *The principle of timing*, according to which individuals may be differently affected by the same events depending on the timing of the event in the individual’s life. For example, the same exposure may have different health effects depending on the time or duration of the exposure. A critical period is a limited time period during which certain exposures influence disease risk; outside this time period no excess risk (or protection) is associated with the exposure. A sensitive period refers to a time period during which certain exposures may have stronger effects on disease risk; outside the time period the excess risk (or protection) associated with the exposure is weaker (Kuh et al., 2003).
5. *The principle of linked lives* highlights the interdependency of individuals, and how transitions in one person’s life may bring changes in other people’s lives as well.

The life course perspective thus offers a theoretical framework that facilitates the study of change. In gerontological research, most studies investigating change over time focus on changes due to aging and factors related to the aging process. With life course theory, other factors become equally important. Age, period and cohort

are central concepts. As they are closely interconnected, their separate effects are nearly impossible to disentangle (Glenn, 2005).

*Aging* refers to the movement through time from one life stage to another; from childhood to adolescence to adulthood, and then further on to middle age and old age. Individuals age differently and cross-sectional data cannot be used in drawing conclusions about the aging process. Interpreting age differences in cross-sectional data as reflecting the process of aging is referred to as the *life course fallacy*. Longitudinal data may also be insufficient in drawing general conclusions about the aging process, as later cohorts may age differently compared to those investigated, referred to as the *fallacy of cohort-centrism* (Riley, 1973). Yet another source of misinterpreting aging-related findings is the *compositional fallacy*, referring to the changing composition of a cohort with increasing age due to selective mortality. For example, as cohorts age the proportion of women increases. Investigating aging cohorts without considering the changing composition may give the erroneous impression that certain traits or diseases increase with age whereas they are in fact a result of the changing composition (Riley, 1973).

The concept of *cohort* puts individuals in a historical context, connecting age and historical time. A cohort can be defined as “the aggregate of individuals . . . who experienced the same event within the same time interval, . . . [most commonly] birth” (Ryder, 1965, p. 845). Societal events and changes often have different impacts on different cohorts depending on what life stage they are in at the time (Ryder, 1965). *Cohort effects* refer to changes or events that differentiate the lives of successive birth cohorts. All members of a birth cohort are not similarly affected by societal change, and thus experiences may vary significantly also within a cohort. Analyzing specific groups within a cohort may therefore be relevant (Elder & Pellerin, 1998).

In contrast to cohort effects where societal changes influence different cohorts (i.e., different age groups) in different ways, *period effects* refer to societal changes or events that influence the whole population in a similar fashion during a specific period of time. However, some argue that period effects may not always have the same impact on all cohorts/age groups (Glenn, 1976). Such cases should perhaps more correctly be termed age-specific period effects. The distinction between cohort effects and age-specific period effects may only be a matter of definition.

## **3.2 DEFINITION AND MEASUREMENT OF LEISURE ACTIVITIES**

Leisure activities can be defined in several ways and include various things. Some have suggested that leisure activity is a goal in itself, while others view activities as a means for reaching certain goals. There are also several approaches to measuring leisure activities, partly depending on how leisure is defined.

### **3.2.1 Defining leisure**

Leisure is mentioned already in the works of Aristotle. He considered leisure the highest and most desirable form of existence. The Greek word for leisure is *schole*

(the root of *school*). Thus, what Aristotle considered leisure was not idleness but rather activities with intrinsic value (activity undertaken for its own sake) such as philosophy, aesthetic enjoyment and religious worship.

Three approaches to defining leisure have been suggested (Parker, 1976). The first is in terms of *time*, “discretionary time.” Leisure time is the time that remains after work, sleep and other obligations or physical necessities are taken care of. This dichotomy between work and leisure may hold for individuals of working age, and, while problems arise already regarding the unemployed and housewives, it is definitely not applicable to the post-retirement period. One way of adapting the time approach to retired persons is to subtract the time spent on “regenerative activities”, i.e., activities that must be carried out in order to maintain one’s physical existence (Klumb & Maier, 2007). Still, this approach is problematic. For example, eating is excluded from leisure time although dinners with friends may very well be considered by the individual as an enjoyable leisure time activity.

The second approach defines leisure in terms of *activities* with certain qualities, often with a focus on the freedom of choice. A simple definition of leisure in this context is “activity chosen in relative freedom for its qualities of satisfaction” (Kelly, 1996b, p. 3). Leisure activity or not is thus determined by the subjective experience of the individual and the individual’s interests and preferences. With this definition, activities that are part of the daily routine, such as reading the morning paper or preparing and eating food, could also be classified as leisure.

A third approach aims to combine the other two. Thus, there is both a time aspect and a qualitative aspect with regard to the activities engaged in, illustrated by the following definition: “[Leisure is] . . . the time which an individual has free from work or other duties and which may be utilized for purposes of relaxation, diversion, social achievement, or personal development” (Gist & Fava, 1964, p. 411).

Moving beyond mere theoretical discussions on leisure definitions to definitions used in practice shows that they can be quite similar. As the name alludes, the activity theory of aging focuses on the activity aspect of leisure. Activity theory defines leisure activity as “any regularized or patterned action or pursuit which is regarded as beyond routine physical or personal maintenance” (Lemon et al., 1972, p. 513). While this definition does not state anything about the content or type of activities, it does exclude regenerative activities, as suggested by Klumb and Maier (2007). In practice however, activity theory focuses on three kinds of activities: informal, formal and solitary activity. The next section deals more fully with different groupings and categorizations of leisure activities.

Swedish welfare research has a different approach to leisure and leisure activities (Tåhlin, 1987). Here leisure activities are viewed as a component of an individual’s living conditions, together with aspects such as health and housing. Participation in leisure activities is thus considered a resource for the individual and a means for obtaining improved living conditions (Tåhlin, 1987).

The studies in this thesis are based on data from surveys measuring the living conditions of the Swedish population since 1968. Thus, certain activities that were considered “resourceful” were identified and included in the surveys, and participation in these was regarded as beneficial independently of the personal experience of the individuals. (See chapter 7.5.3.1 for a discussion of the included activities.)

### **3.2.2 Categorizing and measuring leisure activities**

#### ***3.2.2.1 Categorization of activities***

There is a wide variety of leisure activities included in studies and many different ways of categorizing them. Early gerontological researchers divided leisure activities into three domains: informal, formal and solitary activities (Lemon et al., 1972). Since then many different categorizations have been suggested, based on theoretical considerations as well as empirical findings. As the categorization of activities has conceptual, methodological and empirical implications, it deserves some thought.

Activities can be grouped in many ways, based on the kind of activity, the outcome of the activity or what they provide the individual, and the level of intimacy, to name a few. As mentioned above, Lemon and colleagues (1972), in formulating the activity theory of aging, divided activities based on the level of social intimacy. Kelly (1996a), on the other hand, suggested that divisions be based on what the activities provide the individual, and therefore divided activities into experiential leisure (activities that give intrinsic satisfaction, diversion, relaxation), developmental leisure (activities that offer intellectual challenges, and involve personal competence and creativity), and social leisure (activities that provide social interaction and social status). In studies investigating the association between activities and health, a division of activities based on assumptions concerning the underlying health effect may be feasible. A common approach is to divide activities according to intrinsic qualities such as physical, social, productive, cognitive or recreational, to name a few.

A more theoretical approach is suggested by Klumb and Maier (2007) who divide all activities into regenerative and discretionary, with leisure activities falling under the category of discretionary activities. Discretionary activities are then further divided into productive and consumptive activities. Productive activities are those activities that can be performed by someone else without losing its benefit (e.g., gardening and shopping), while consumptive activities are performed for their own sake (e.g., meeting friends or reading a book). Of course, the line between productive and consumptive activities may not always be a clear one as productive activities such as those mentioned above may very well be performed for their own sake.

The categorization of activities can influence study results and may make comparisons and generalizations across studies difficult. For example, some studies categorize gardening as a physical activity, while others categorize it as a productive activity. Both these categorizations can be justified. In the SWEOLD data on which the studies in this thesis are based, examples can be found in two studies where the activities have been grouped in different ways (Lennartsson & Silverstein, 2001; Silverstein & Parker, 2002). These differences in categorization depend partly on differing approaches to activities in the studies. While the study by Lennartsson and

Silverstein categorizes activities along the two dimensions solitary-social and sedentary-active followed by a factor analysis that results in the categories social-friendship, social-cultural, solitary-sedentary and solitary-active; the study by Silverstein and Parker is based on categorizations in earlier studies as well as heuristic considerations by the authors, resulting in the following six categories: culture-entertainment, productive-personal growth, outdoor-physical, recreation-expressive, friendship and formal-group.

Another approach is to take the multidimensional character of each activity into account (Karp et al., 2006). This can be done by assigning multiple scores for physical, social and mental (and perhaps even other) components to each activity. This method of having multiple scores for each activity is an interesting alternative but needs more testing.

### ***3.2.2.2 Measurement of activities***

The measurement of leisure activities is partly dependent on its definition and partly on the focus and purpose of the study. Only some kinds of activities (e.g., physical or social activities) may be interesting or relevant to the study outcome, or only those activities that the individual himself/herself conceives of as leisure activities.

In general, surveys measuring leisure activities focus either on the quality or the quantity of the activities. Focusing on quantity means the type and frequency will be targeted. If the focus is on quality, activities that the individual values and enjoys are targeted, as well as activities that the individual considers meaningful. It is more common to measure the quantitative aspects of leisure activities, probably because these aspects are easier to measure.

The actual operationalization and procedure of measuring leisure activities varies greatly. There is no consistent way of measuring leisure activities, especially among older individuals, and therefore most studies use their own lists of activities, scales or open-ended questions. Measuring leisure activities with an open-ended question is potentially the best method as it captures the subjective views of the individual. On the other hand, the risk of under-reporting is high with this kind of measuring technique. Especially in the case of elderly persons, this can be a memory test. Using a list of common activities followed by a complementary open-ended question to capture additional activities may be a good alternative.

The time span covered by different surveys also varies, from activities done yesterday to activities usually engaged in during the past year. Yet another factor is the frequency of participation which ranges from a detailed, objective account of length, intensity and frequency to a subjective assessment of “sometimes” or “often.”

Attempts have been made to measure a comprehensive picture of the leisure activities of older individuals (Baum & Edwards, 2001; Drummond et al., 2001; Matsutsuyu, 1969). These attempts have been criticized for not only including activities pertaining to leisure, for only targeting select disease groups or for only being

valid in specific cultural contexts. A modified version of one of the scales, the Interest Checklist, has been evaluated and tested in relation to older individuals' leisure activities, with initial results indicating acceptable validity and reliability (Nilsson & Fisher, 2006).

In these studies, leisure activities were measured using a list of common activities. For a description of how leisure activities were measured and what activities were included, see chapter 5.2.1.

### **3.3 A LIFE COURSE PERSPECTIVE ON LEISURE ACTIVITIES**

The theoretical framework offered by the life course perspective is very useful when investigating changes in leisure activities over time. Apart from the effects of aging on leisure activities, life course theory also stresses the importance of considering cohort and period effects on the development of different trajectories in human lives (Elder et al., 2003). Cohort and period effects influence late-life leisure participation in several ways. It is difficult, not to say impossible, to differentiate age, cohort and period effects, but a rough framework can be delineated.

#### **3.3.1 Effects of aging**

Over the life course, individuals build and develop a leisure repertoire through personal, financial and social investments. These investments concern time and energy, equipment and resources, and commitments and involvement in organizations. Considering these lifelong investments in leisure activity, the maintenance of continuity in late life, as suggested by continuity theory and the model of selective optimization with compensation for example, seems evident. Just because the work role is lost in retirement does not mean all other roles (including leisure roles) are altered or changed. On the contrary, as suggested by activity theory, diminishing role demands may be compensated through leisure involvement: more socially oriented leisure activities as the social network connected to the workplace is lost due to retirement, and more challenging and developmental leisure as work tasks are left behind.

The decline in leisure participation that eventually takes place in most people's lives is not because of age *per se*. However, as age (or aging) is usually accompanied by decrements in energy and functional ability as a consequence of health conditions, and, as both the individual and the individual's social network (and leisure companions) will be affected; there inevitably will be restrictions in leisure participation with increasing age.

Longitudinal studies following individuals over time have found that individuals are commonly consistent and stable in the type of activities they engage in over time. Changes usually occur gradually (Verbrugge, Gruber-Baldini, & Fozard, 1996). There are very few studies covering long periods of time. Most studies cover periods of up to about ten years. In a study following older individuals (aged 60 and older) for eight years, results showed that a majority of individuals continued the activities they engaged in over the time period (Strain et al., 2002). Individuals



ceasing activity participation were generally older and experienced a decline in functional status over the follow-up period. Other longitudinal studies have also found that older individuals gradually decrease the time they spend on leisure activities, while time spent on other activities (such as walking or shopping) may increase (Armstrong & Morgan, 1998; Bennett, 1998).

In a study attempting to disentangle the effects of age, period and cohort with data from 1985, 1990 and 1995 (Bijnen et al., 1998), results suggested an age effect. While time spent walking remained stable, time spent on total physical activity, gardening and bicycling decreased over the ten-year study period. This decline was in part due to declining physical function.

### **3.3.2 Cohort effects**

There is much debate regarding new generations of older adults differing from past generations, and the ways in which these differences will influence social systems and society by and large. Today's, and probably to an even greater extent tomorrow's, older people will differ from previous generations due to societal changes during their earlier life stages (Huber & Skidmore, 2003). The largest differences are likely to be found among future cohorts of older women, as they have participated in the labor market to a great extent and also had the choice of postponing parenthood because of the increasing availability of contraceptives (Arber, Davidson, & Ginn, 2003). These cohorts (both women and men) have more opportunities and resources—financial, educational, occupational and health resources—to invest in themselves and engage in various activities, both in late life and earlier during young adulthood and midlife. The common view that future generations of retirees will indulge in leisure and consumption has been questioned by others with the objection that the lifestyle of the baby boom generation (with more consumption and higher divorce rates than previous cohorts, for example) may lead to some groups or individuals devoting themselves wholly to leisure pursuits, while others may be isolated and caught in financial problems (Fairhurst, 2003; Scales & Scase, 2000).

Cohort differences in leisure interests and the level of participation in leisure activities have been investigated by a few studies. A study investigating leisure interests and participation in different cohorts of older Finns at the age of 66 found that younger cohorts had more leisure interests, and among women there was also an increase in organizational engagement among more recent cohorts. There were also cohort differences in informal social contacts, but with no consistent pattern (Pohjolainen, 1991). A Dutch study comparing two cohorts in early old age also found that the more recent cohort was more socially active (Broese van Groenou, 2006). Results from a Swiss study showed similar results; individuals in the more recent cohort favored engagement and did not agree with the image of disengagement in late life. They also participated more in physical activities, which may in part be explained by general attitudinal changes regarding the importance of physical activities and increased encouragement for physical activity even in old age (Lalivé d'Épinay, Maystre, & Bickel, 2001).

There may also be within-cohort differences. Individuals with higher socioeconomic status (educational and occupational status) enter old age with higher activity levels, suggesting that groups with greater access to social resources may be privileged in entering old age (Bukov, Maas, & Lampert, 2002). Although these findings show intra-cohort effects, they may be transferrable also to inter-cohort effects, with more privileged cohorts entering old age with higher participation levels. On the other hand, the association between socioeconomic factors and activities seems to be weaker in more recent cohorts of older individuals (Pohjolainen, 1991).

### 3.3.3 Period effects

*Period effects*, sometimes termed secular effects, refer to societal changes or events that influence the whole population in a similar fashion. In this context, for example, the greater selection of various kinds of activities, cultural events, travel destinations, cafes and restaurants facilitate leisure engagement for individuals of all ages. Increased accessibility to different locations for participating in activities facilitates participation for everyone, but older and disabled individuals in particular; perhaps more appropriately termed an age-specific period effect.

In a study of change in physical activities in different age groups over seven years (during the 1980s), results showed that all age groups (except for those in their twenties) increased their levels of physical activities, suggesting a period effect. However, while increases over time were largest for the older cohorts among men, among women those in midlife increased the most. The authors' interpretation was that these groups were most susceptible to the media campaigns of the time stating the benefits of physical activities, and they were also the groups with more time, energy and financial resources to actually engage in physical activities, again perhaps suggestive of age-specific period effects (Curtis, White, & McPherson, 2000). Later studies have found that the overall trend of increasing physical activity during the 1980s was not continued during the 1990s and beginning of the 2000s (Barnett et al., 2007).

Results from another study also suggest that leisure activities have increased from the 1960s to the 1990s. Increases were especially pronounced for socializing with friends and relatives among women in young and middle adulthood and men of all ages. Converging gender roles in paid work and housework, together with an overall decrease in work hours in the general population may be part of the explanation (Verbrugge et al., 1996). Increasing levels of socializing with friends and relatives was also reported in a Swedish study covering the 1970s to 2000 (Rostila, 2007).

In contrast to trends of increasing participation in some kinds of leisure activities, participation in "collective" activities such as civic and organization engagement seems to be decreasing. The past decades have witnessed general declines in civic and organizational engagement both in the United States (Putnam, 1995, 2000) and in Sweden (Rostila, 2007).

### 3.4 FACTORS INFLUENCING PARTICIPATION IN LEISURE ACTIVITIES

In old age, interests and participation habits are commonly a continuation of earlier habits and behaviors, but there are still other factors that have an impact. Some factors were mentioned above: cohorts may differ in participation rates due to differing opportunities and resources earlier in life, and societal changes may facilitate or impede leisure participation in old age.

*Gender* has traditionally been an important dividing line for what kinds of activities that were considered suitable to engage in. Women commonly engaged in indoor sedentary activities such as hobbies (knitting, sewing), while men engaged in more physically demanding outdoor activities (Bennett, 1998; O'Brien Cousins, 1998). These traditional gender roles are changing (Arber et al., 2003), but in the cohorts investigated here they are still rather pronounced.

*Socioeconomic status* is another important factor influencing leisure participation. According to French sociologist Bourdieu, socioeconomic status shapes an individual's leisure interests and preferences, especially when it comes to cultural leisure activities (Bourdieu, 1984). Different measures of socioeconomic status affect participation in leisure activities in different ways. So for example *educational level* has been found to increase social and productive participation (Bukov et al., 2002). Higher education may primarily influence leisure participation through higher occupational status and income. When it comes to *occupational status* it has been hypothesized that individuals in physically demanding occupations with little intellectual stimulation may seek out more challenging leisure to compensate, but research seems to point in the opposite direction (Tählén, 1987). Putting it simply, manual workers may be too tired after a day's work to engage in challenging leisure activities, while non-manuals with interesting and stimulating jobs may be more inclined to seek that kind of leisure activities also after work hours. Another interpretation is that individuals that choose more challenging and stimulating occupations also pursue challenging and varied leisure activities to a greater extent. *Income* is of course closely related to occupation, although to a lesser extent after retirement. Limited financial resources may be an important obstacle in pursuing one's leisure interests after retirement. Women, especially widows, in the cohorts investigated here are among the most disadvantaged due to their limited pensions (Arber & Ginn, 1991).

*Marital status and the social network* may also influence an individual's level of leisure activities. Studies on participation in physical activities among older individuals suggest that having a spouse or contact with relatives and friends is associated with a higher level of activity (Vance et al., 2007), especially among women (Satariano, Haight, & Tager, 2000, 2002). Membership in informal associations is more common among married and widowed men compared to the divorced and never-married (Perren, Arber, & Davidson, 2003). The association between social networks and leisure activities is likely bi-directional as participation in (non-solitary) activities widens the social network.

*Urban or rural* settings primarily affect the type of leisure activity. While living in an urban setting may entail greater availability of cultural activities and restaurants, ru-

ral settings offer other kinds of opportunities for leisure time, such as fishing, hiking, outings or boat trips.

In old age, *health* (as measured by physical and cognitive function) is an important factor that affects participation in leisure activities. Individuals with functional or cognitive impairments are more likely than healthy individuals to have low engagement in activities or to decrease activity involvement (Bukov et al., 2002; Li & Ferraro, 2005), especially when faced with deteriorating health (Strain et al., 2002). However, individuals commonly adjust to their new circumstances of deteriorating health and function by modifying their frequency or intensity of participation or their choices of activities, as suggested by the continuity theory (Atchley, 1989, 1999) and the model of selective optimization with compensation (Baltes & Baltes, 1990). Thus, some activities may remain more or less unchanged in spite of worsening health and functional decline.

The association between health and leisure activities works in both directions. For most activities, a basic level of physical and/or cognitive function is required for participation. Most research, however, focuses on the other direction of the association, which is the effect of leisure activities on different health outcomes. The following section will deal with this topic in depth.

## 4 LEISURE ACTIVITIES AND HEALTH

Over the years, studies investigating the association between leisure activities and health have accumulated. Various activities have been studied (e.g., physical, social, productive and volunteer activities), in relation to many different outcomes (e.g., physical function, cardiovascular health, cognition and survival, but also “soft” variables such as well-being and life satisfaction).

### 4.1 ACTIVITIES AND WELL-BEING

Already in the 1950s, leisure activities were identified as important correlates of well-being in older people (Havighurst & Albrecht, 1953). Different measures of well-being, primarily life satisfaction, were used in the development of the early gerontological theories. Activity theorists maintained that engagement in leisure activities was an important component of successful aging and the maintenance of life satisfaction in old age (Lemon et al., 1972; Longino & Kart, 1982). Studies investigating the association between activities and life satisfaction as suggested by activity theory have reported associations between both informal and formal activities and life satisfaction (Knapp, 1977), and informal activities and life satisfaction (Longino & Kart, 1982), while they found no associations between solitary activities and well-being. As these studies were all cross-sectional, no conclusions regarding the directionality of the associations can be drawn.

More recently, a study on elderly people’s quality of life showed that social and leisure activities were considered important for late-life quality of life by the elderly (Gabriel & Bowling, 2004). Recent gerontological thought on successful aging also asserts that active engagement with life, defined as involvement in meaningful activities (primarily productive activities) and close relationships, is an important component of successful aging (Rowe & Kahn, 1997).

The association between leisure activities and well-being has also been studied in longitudinal studies. In a six-year study, participating in social groups for older individuals, sports/games, hobby activities, music/art/theater, reading or writing, light housework/gardening as well as the overall activity level were positively associated with happiness at follow-up (Menec, 2003). Volunteer activities have also been reported to affect well-being in old age (Van Willigen, 2000).

Many studies have found a positive association between physical activities and different measures of well-being, primarily quality of life and life satisfaction (Rejeski, Brawley, & Shumaker, 1996; Rejeski & Mihalko, 2001). In a longitudinal study, physical activity was related to later self-efficacy, self-esteem and positive affect, which in turn affected quality of life (Elavsky et al., 2005). Also among the very old (aged 90 and above), there seems to be an association between physical activities and life satisfaction (Hillerås et al., 1999).

Beneficial effects on well-being are also reported by studies investigating the role of leisure activities in the face of difficult life events, such as widowhood or disability. Individuals who maintain or increase their level of activity seem to maintain their well-being and adapt more easily to the new life circumstances (Duke et al., 2002; Silverstein & Parker, 2002).

## **4.2 ACTIVITIES AND DIFFERENT HEALTH OUTCOMES**

Preserving well-being in late life is important, but of even greater importance and consequence is the maintenance or improvement of health and function. Activities have been investigated in relation to many health outcomes. Here results from longitudinal studies concerning three broad categories will be mentioned: physical and cognitive function, cardiovascular health and depression.

### **4.2.1 Physical and cognitive function**

Beneficial effects of physical activities on physical function and performance of activities of daily living (ADL) in late life have been shown in many different studies (for reviews, see DiPietro, 1996, 2001; Fiatarone Singh, 2002). However, not only physical activities seem to protect against functional decline and disability; studies suggest that also other kinds of leisure activities can have an impact.

Luoh and Herzog (2002) found that volunteer activities and paid work after retirement protected against ADL limitations two years later, independent of earlier health status and ADL limitations. Menec (2003) found similar results for volunteering with six years follow-up. Mendes de Leon and colleagues (2003) showed strong cross-sectional associations between social engagement and disability, but no clear longitudinal association. The protective effect of social engagement seemed to decrease with time, suggesting a reciprocal association between social engagement and disability where functional decline leads to lower levels of social engagement which in turn can speed up the process of disability.

Associations between heavy housework/gardening, mass activities (such as bingo or community clubs) and church-related activities and later function have also been reported (Menec, 2003). Church attendance has not however been consistently related to later disability across different studies, according to a review (Powell, Shahabi, & Thoresen, 2003).

A vast body of research has investigated the association between different kinds of leisure activities and cognitive status or dementia. Studies investigating the effects of physical activities on later cognitive impairment and dementia report that midlife physical activity lowers the risk of dementia (Rovio et al., 2005). This association is further reinforced since physical inactivity, by influencing cardiovascular parameters, may be a risk factor for later cognitive impairment and dementia (Kivipelto et al., 2001; Kivipelto et al., 2005). Many studies also suggest that participation in different leisure activities in late life protect against dementia; social, mental and physical activities all seem to influence the onset of dementia (for a review, see Fratiglioni et al., 2004).

### **4.2.2 Cardiovascular health**

The association between activities and cardiovascular health has mainly been studied with physical activities as predictors. The risk of a sedentary lifestyle and the benefits of being physically active in relation cardiovascular disease are widely acknowledged (Department of Health and Human Services, 1996). Benefits of physical activities have also been found among older adults (Bassey, 2000; Batty, 2002; Fiatarone Singh, 2002). If conducted regularly, even light physical leisure activities such as gardening or walking seem to improve older individuals' cardiovascular risk profiles (LaCroix et al., 1996; Mensink, Ziese, & Kok, 1999).

Studies on the association between social integration and cardiovascular disease show somewhat mixed results, although protective effects are increasingly found, especially among men (Seeman, 1996). A higher level of social integration lowered the risk of coronary heart disease (Orth-Gomér, Rosengren, & Wilhelmsen, 1993) as well as stroke (Kawachi et al., 1996), although the latter study did not find an association with coronary heart disease. Another study found an association between network scope (number of different domains that the respondent had contacts in) and heart disease, but no association with network size (Vogt et al., 1992). Social integration and social support also seem to have positive effects on the recovery process after myocardial infarction and stroke (Seeman, 1996).

There is some evidence that regular church attendance protects against cardiovascular disease, probably mediated by the encouragement of a healthy lifestyle (Powell et al., 2003).

### **4.2.3 Depression**

Depressive symptoms and depression are quite common in old age. Preventing or alleviating these problems is therefore an important issue. In a review, physical activities were found to protect against the development of depressive symptoms in old age. Effects were particularly strong among those with a preexisting health problem (Fiatarone Singh, 2002).

Many studies have also reported a protective effect on depression for more socially integrated individuals (for a review, see Seeman, 1996). A study with repeated measures of both social engagement (a combination of social and productive activity) and depressive symptoms showed an independent association between social engagement and depressive symptoms, and a protective longitudinal effect with increasing levels of social engagement among those reporting low levels of depressive symptoms at baseline (Glass et al., 2006). Volunteer activities, such as volunteering for a religious or political organization or a senior citizen group, also seem to protect against depression (Li & Ferraro, 2005). Church-related volunteering has been found to be especially beneficial for mental health (Musick & Wilson, 2003), as was regular church attendance (Strawbridge et al., 2001).

### **4.3 ACTIVITIES AND SURVIVAL**

Numerous studies have investigated the effects of various leisure activities, especially physical and social activities, on subsequent mortality. Individuals with higher levels of physical activity or physical fitness have been shown to have a lower mortality risk compared to those with low levels of physical activity or fitness. There also seems to be a dose-response relationship with increasing levels of physical activity rendering additional survival benefits (Morgan & Clarke, 1997; Oguma et al., 2002; Schnohr, Scharling, & Jensen, 2003).

The association between social integration—including social activities, social networks and social support—and mortality has been extensively studied. The issue was first highlighted in the late 1970s and early 1980s (Berkman & Syme, 1979; House, Robbins, & Metzner, 1982), followed by numerous other studies over the years reporting increased longevity from social engagement, social networks and social support (for reviews, see Bowling & Grundy, 1998; Seeman & Crimmins, 2001).

Other kinds of leisure activities have also been investigated in relation to survival. Productive and volunteer activities were found to decrease mortality risk in several studies (Glass et al., 1999; Luoh & Herzog, 2002; Musick, Herzog, & House, 1999; Shmotkin, Blumstein, & Modan, 2003), even when other kinds of activities (e.g., physical) were accounted for (Glass et al., 1999; Shmotkin et al., 2003). Also religious involvement, such as attending religious services, has been found to reduce mortality risk (la Cour, Avlund, & Schultz-Larsen, 2006; Powell et al., 2003), although questioned by some with the objection that it is likely mediated by other factors such as social engagement (Bagiella, Hong, & Sloan, 2005).

Cultural and solitary activities have not been studied to the same extent as the above mentioned activities, but survival benefits have been reported also for these activities. Cultural activities, such as going to the cinema, theater and exhibitions, lowered mortality risk both after eight and fourteen years of follow-up (Bygren, Konlaan, & Johansson, 1996; Konlaan, Bygren, & Johansson, 2000). Solitary activities, such as gardening, hobby activities and reading, also seem to lower mortality risk, at least among men (Jacobs et al., 2008; Lennartsson & Silverstein, 2001).

Studies reporting no relationship between leisure activities and survival are very few (Lee & Markides, 1990). The dearth of such studies could be explained by the robustness of the association between activities and survival, or because non-significant results are considered uninteresting and thus not reported.

### **4.4 HOW DO LEISURE ACTIVITIES PROMOTE HEALTH?**

There are several ways in which leisure activities may influence well-being, health and survival. Also, different kinds of activities are likely to have different effects on the outcomes in question. Some theoretical hypotheses regarding the influence of activities on health have been advanced. After going through two hypotheses, three pathways linking activities with health will be presented.



## 4.4.1 Possible theoretical explanations

### 4.4.1.1 *The reserve hypothesis*

Aging can be referred to as the lifelong wear and tear on the body and its reserve capacity, both due to environmental factors and to “chance damage” in the body’s organs and tissues that accumulates over time. Studies suggest that older individuals have a sizeable reserve capacity, and although it is reduced with increasing age, it can be activated through for example exercise and training (Baltes & Baltes, 1990). The reserve capacity of the human body has also been the focus of extensive discussions in gerontology and geriatrics in relation to the concept of frailty. Frailty occurs, according to some (biomedical) definitions of frailty, when the body’s reserve capacity is depleted (Bortz, 2002).

Research in biology has found associations between social factors and biological age (Cherkas et al., 2006; Epel et al., 2004), a finding that has been questioned by others (Adams et al., 2007; Hornsby, 2006; Kuh, 2006). A recent study showed that a sedentary lifestyle seems to speed up the aging process by affecting telomere length<sup>1</sup> even after considering the influence of smoking, body mass index and socioeconomic status (Cherkas et al., 2008). More studies, especially longitudinal ones, are needed to back this finding, as many other factors may differ between active and sedentary individuals and in turn affect the aging process and telomere length (Guralnik, 2008).

Although this issue has not been sufficiently investigated, it could be hypothesized that favorable conditions and behaviors across the life course, such as regular participation in different kinds of activities, slows the aging process. Thus sedentary and socially isolated individuals, as compared to active and integrated individuals, can be hypothesized to be more vulnerable to effects of aging. Put differently, this would entail a health buffer or a reserve capacity in older individuals with a lifetime of health-promoting behaviors such as engagement in different activities, which would help them better cope with the ailments of old age. Accordingly, benefits of continuous engagement over the life course would remain despite lowered participation levels in late life.

The idea of a reserve has had a great impact in cognitive psychology. According to the ‘cognitive reserve’ hypothesis certain aspects of life experience, such as educational and occupational attainments or an engaged lifestyle, provide individuals with a cognitive reserve that makes them less sensitive to and better able to cope with cognitive pathology (Katzman, 1993; Stern, 2002).

A similar hypothesis developed in the social sciences is the hypothesis of cumulative advantage and disadvantage. This hypothesis maintains that health-damaging and health-promoting socio-environmental exposures accumulate over the life course, leading to variations in disease and mortality risk (Ben-Shlomo & Kuh, 2002; Dannefer, 2003). Cumulative effects are often exacerbated by chain reactions;

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<sup>1</sup> A telomere is a region of repetitive DNA at the end of chromosomes, protecting them from damage. As people age, their telomeres become shorter, leaving cells more susceptible to damage and death.

one disadvantage increases the likelihood of experiencing another, and similarly, advantages are commonly associated with other advantages. There are thus both chains of risk and protective chains (Kuh et al., 2003).

This hypothesis has mainly been investigated with regard to socioeconomic disadvantages over the life course. Studies of socioeconomic disadvantages in childhood, young adulthood, midlife and perhaps even further suggest that effects accumulate, with individuals who have experienced a lifetime of disadvantaged socioeconomic conditions experiencing worse health and higher mortality risk than individuals with advantaged or fluctuating socioeconomic circumstances (Adams et al., 2004; Davey Smith et al., 1997; Ljung & Hallqvist, 2006). However, results are inconclusive as to whether the most recent conditions are more important, if there are certain critical or sensitive periods during which disadvantaged conditions infer greater harm or if the risks associated with disadvantaged conditions add up across the life course (Hallqvist et al., 2004).

If the effects of disadvantages accumulate, it is reasonable to assume that effects of advantages also do. Yet cumulative effects of advantages have hardly been studied (although it may be argued that when disadvantageous conditions are studied, they are studied in contrast to advantageous conditions). It seems reasonable to hypothesize that the accumulation of advantages provides individuals with a health buffer in the same way that cumulative disadvantages lead to increased vulnerability (Seeman et al., 2002). Considering the association between activities and health from a life course perspective it makes intuitive sense that the benefits of an active lifestyle, with physical as well as social leisure activities, accumulate over time, as do effects of inactivity and social isolation (Seeman, 1996; Seeman et al., 2002).

#### ***4.4.1.2 The disuse hypothesis***

In contrast to the ideas of accumulation and reserve, it may be that the beneficial effects of leisure activities are maintained only as long as the activities are kept up, as suggested by the disuse hypothesis. Once activities are stopped, the positive health effects also diminish. Roughly put, use it or lose it.

The disuse hypothesis has also been used in cognitive psychology. According to the disuse hypothesis, mental stimulation from activities has positive effects on cognitive performance in late life, whereas discontinuation of activities and the disuse of cognitive skills lead to cognitive decline (Salthouse, 1991). Although not much support has been found for this hypothesis in relation to cognitive aging, it may be more applicable in other fields.

A clear example of the disuse hypothesis' applicability relates to muscle mass. The disuse of muscles as a result of reduced activity leads to muscle atrophy (sarcopenia). Although the development and progression of sarcopenia in late life is affected by several different factors, physical inactivity is an important factor in old age (Doherty, 2003). For example, the disuse hypothesis has been discussed in relation to whiplash injuries. Following a whiplash injury some individuals develop "avoidance behavior": they avoid moving the head and neck out of fear for pain or

for causing further damage. This disuse of the muscles leads to atrophy and reduced blood flow which in turn is related to pain. As a consequence the damage (pain) remains although the original physical injury has healed (Vendrig, McWhorter, & van Akkerveen, 2002). In frail persons with little physical reserve, even short periods of immobilization, such as the consequence of a fracture or illness, can lead to muscle atrophy, constipation, and other problems that can set off a spiral of deterioration.

#### **4.4.2 Pathways linking leisure activities and health**

The original papers included in this thesis focus on the association between leisure activities and survival. However, as this association is likely mediated by well-being as well as health, the scope of this section will be broadened to include pathways to these outcomes as well.

Several pathways linking leisure activities and health have been suggested. In general, participation in leisure activities provides the individual with added physical and mental stimulation and often entails contact with other people. Three broad pathways, partly overlapping and often at work simultaneously, link activities with health: physiological, psychosocial and behavioral.

##### ***4.4.2.1 Physiological pathways between activities and health***

More and more studies support the hypothesis that the social environment does “get under the skin” and affect physiologic parameters. The stress-reducing effect of leisure activities, some more than others, is perhaps the strongest physiological pathway. Already in the late 1970s, Berkman and Syme (1979) reported that individuals lacking social ties and resources had reduced “host resistance” and were thus more susceptible to morbidity and mortality. Manifestations of reduced host resistance may vary due to differences in vulnerability between individuals (Seeman, 1996). The effects of the social environment and leisure activities (not including physical activities) on physiologic parameters, both positive and negative, are likely to be rather modest. However, as leisure participation and the social environment are relatively stable over time, accumulation of these modest physiological effects may in the long run lead to differences in the development of disease (Seeman, 1996; Seeman et al., 2002).

The association between social interaction (or social support) and immune function is well-established: positive relationships are associated with better immune function, while stressful relationships can lead to dysfunctions in the immune system (Kiecolt-Glaser et al., 2002; Uchino, 2006). Older individuals seem to be more sensitive to stressful relationships and circumstances (Graham, Christian, & Kiecolt-Glaser, 2006). Physical activities (moderate exercise) have also been found to influence immune function, even in late life, by enhancing so-called natural killer cell function (Venkatraman & Fernandes, 1997). The evidence regarding physical activity and immune function in old age is still inconclusive (Bassey, 2000).

The neuroendocrine system is also influenced by social integration, both positive and negative (Seeman & McEwen, 1996). Protective effects of positive interactions,

especially in close and intimate relationships involving touch, are hypothesized to be associated with oxytocin release. Oxytocin may in turn influence the cardiovascular system, and has been suggested as a potential link between social support and cardiovascular health (Knox & Uvnäs-Moberg, 1998).

So the cardiovascular system is also involved in the link between activities and health. Studies suggest that both physical and social activities impact the cardiovascular system (Batty, 2002; Seeman & McEwen, 1996; Uchino, 2006). Negative social interactions elevate cardiovascular reactivity, for example heart rate and blood pressure, while positive interactions lower reactivity (Knox & Uvnäs-Moberg, 1998). When it comes to physical activities many studies have shown evidence of protective effects on cardiovascular risk factors (Batty, 2002). Many leisure activities have a physical component although they are not physical activities as such; for older individuals, mere transportation to and from a location, though not strenuous, may entail cardiovascular benefits (LaCroix et al., 1996; Mensink et al., 1999).

#### ***4.4.2.2 Psychosocial pathways between activities and health***

Psychosocial pathways include enhancement of self-esteem and self-efficacy, the provision of social networks and social support and their benefits, as well as role support and the provision of meaningful social roles. These factors are all in different ways related to stress-coping abilities, which in turn influence physiological parameters, as reported in the previous section.

Many activities, for example productive and volunteer activities, provide individuals with feelings of usefulness and competence as well as a sense of control and mastery (Berkman et al., 2000). Feelings of being in control have been related to psychological well-being (Menec & Chipperfield, 1997), but also to physical health outcomes by reducing the impact of functional decline on everyday function and disability (Mendes de Leon et al., 1996). Feelings of usefulness have also been shown to lower disability and mortality risk (Gruenewald et al., 2007).

Participation in most non-solitary leisure activities provides the individual with a greater social network. Besides providing different kinds of support (e.g., emotional, instrumental and informational), individuals in the social networks may encourage healthy behaviors by being an exercise partner, sharing meals and providing support for smoking cessation. Mere companionship also has beneficial health effects (Östberg & Lennartsson, 2007), and it seems the quality of the relationship may be more important than the social activity itself (Litwin & Shiovitz-Ezra, 2006). Social support also seems to benefit the provider; older persons providing emotional support seem to enjoy better self-esteem (Krause & Shaw, 2000).

Berkman and colleagues (2000) argue that the benefits of social integration are not limited to the provision of support, but more likely depend on the individual's participation in a meaningful context. This is also supported by a study reporting that being in a context with friends lowered mortality risk above and beyond the effect of the activity (Maier & Klumb, 2005).

Being in a context with friends also provides role support for the individual, which has been linked with life satisfaction by the activity theory (Lemon et al., 1972). Occupying multiple roles seems to predict better health and successful aging, at least among women (Moen, Dempster-McClain, & Williams, 1992). Berkman and colleagues maintain that meaningful social roles (e.g., familial and community roles) are defined and reinforced by social engagement. These roles promote self-esteem and feelings of belonging and attachment, which in turn may improve adaptation to stressful life situations, enhance positive affect and protect against depression (Berkman et al., 2000).

The protective effects of activity and the risk of social isolation are separate things and may have different pathways linking them to health. Social isolation may lead to depression and altered coping strategies, which in turn may lead to increased risk-taking behavior (Berkman & Syme, 1979). It is also important to remember that not all social ties are supportive. Some friends or networks may promote health-damaging rather than health-enhancing behavior, or contribute to negative affect rather than provide emotional support (Seeman & Crimmins, 2001). Women seem to be more vulnerable to relationship quality than men (Lyyra & Heikkinen, 2006). Similarly, excessive involvement in activities may lead to stress and thus reduce health benefits. Studies of volunteer activities suggest that moderate levels may be most beneficial (Musick et al., 1999; Windsor, Anstey, & Rodgers, 2008).

#### ***4.4.2.3 Behavioral pathways between activities and health***

Behavioral pathways are closely related to psychosocial ones. As mentioned above, activities are likely to affect social networks and the access to social support which in turn affect health-related behaviors (Berkman et al., 2000). Social networks can of course negatively impact behaviors, but focus here will be on positive effects.

Participation in activities gives access to a greater social network. A socially supportive network can provide relevant information and assistance on health care and health practices and thus influence behaviors related to health-care utilization and compliance with medical regimens. Other health behaviors are also regulated by the individual's social environment because of the social influence exerted by the social network (Berkman et al., 2000). This influence may affect norms (in both positive and negative directions) regarding physical activity, diet, sleeping habits, smoking and excessive alcohol consumption, behaviors which in turn have physiological consequences (Kiecolt-Glaser et al., 2002).

Participation in church-related activities is commonly related to a healthier overall lifestyle, but longitudinal studies have also shown that regular church attendance is related to improved health behaviors over time as well as increased social contacts, improved or maintained mental health and marital stability. Effects on improved health behaviors and mental health were stronger among women than men (Strawbridge et al., 2001). Other formal and volunteer commitments may also be conducive to health-promoting behaviors. But again, not *all* contexts and environments are supportive, and some may even promote health-damaging behaviors (although this may be primarily relevant in younger ages).

## 4.5 REVERSE CAUSALITY

Some researchers argue that the association between activities and health, particularly when older individuals are concerned, is a result of reverse causality, i.e., that health status influences participation levels rather than the other way around. This is an important issue when studying leisure activities.

There is no denying the strong effect of health and functional/cognitive status on participation rates in late life, but accumulating research suggests that participation in leisure activities has a protective effect on health and mortality above and beyond the initial health status. Most likely, the association between activities and health is bi-directional, particularly in old age, when rates of morbidity and mortality are high. When the study population is old and the studied outcome is mortality, it may be particularly difficult to separate the mutual influence activities and health exert on each other, especially since the general vulnerability induced by a lifetime of sedentary and socially inactive habits may take different expressions in different individuals (Seeman, 1996). In these situations, sufficiently controlling for health status is a crucial but arduous task, and thus the captured association may to some extent reflect the association between health and survival.

Although there seems to be convincing evidence pointing toward the beneficial effects of activities on different health outcomes, some may argue that instead of health benefits there are selection mechanisms at work. A selection mechanism exists when people with a certain characteristic, for example better health or well-being, participate in activities to a greater extent. This resembles reverse causality. A parallel can be drawn to the supposedly protective effects of marriage, where investigators have discussed whether mentally and physically healthier individuals are selected into marriage to a greater extent or whether marriage does in fact have a protective effect (Goldman, 1993).

As many longitudinal studies have been conducted in this field—and even some experimental—it is reasonable to assume that even if selection mechanisms would have a certain effect, with healthier individuals participating to a greater extent, there is much evidence for a chronological pathway through activities to health.

## 5 MATERIAL AND METHODS

### 5.1 THE LEVEL OF LIVING SURVEY AND THE SWEOLD STUDY

The Level of Living Survey (LNU) consists of a nationally representative sample of the Swedish population aged 18–75 and was first carried out in 1968 (Erikson & Åberg, 1987). The LNU sample consists of about 6000 individuals. Follow-ups were carried out in 1974, 1981, 1991 and 2000, with additions of younger individuals and immigrants to keep the sample nationally representative. The Swedish Panel Study of Living Conditions of the Oldest Old (SWEOLD) consists of individuals previously included in the LNU sample, but who have passed the upper age limit of 75 years (Lundberg & Thorslund, 1996). The SWEOLD study was first carried out in 1992, followed by data collections in 2002 and 2004. Sample sizes in the SWEOLD studies differ because of slightly varying inclusion criteria and age limits. Together, the LNU surveys and SWEOLD studies make up a longitudinal database covering a period of 36 years, with seven measurement points (see Figure 1 for a schematic overview). Both cross-sectional and longitudinal studies are therefore possible.

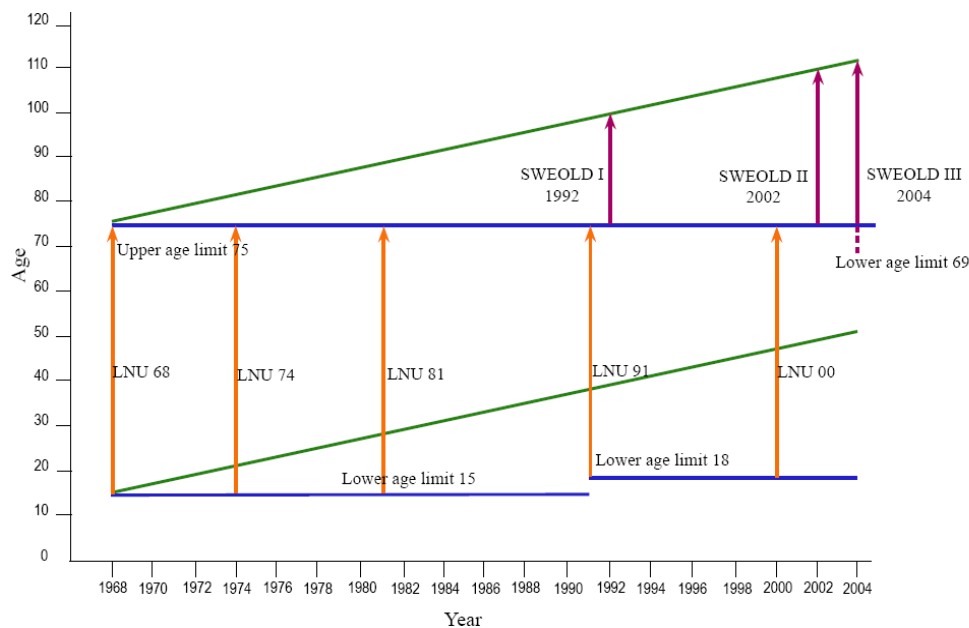


Figure 1. A schematic picture describing the LNU and SWEOLD studies.

Respondents were interviewed in their homes by professional interviewers. For individuals who could not be interviewed because of cognitive impairment or physical weakness, proxy interviews with relatives or health care personnel were conducted. This was primarily relevant for the SWEOLD samples. In the LNU, questions about work life, family situation, economy, living conditions, health status and leisure activities were asked. In SWEOLD many of the questions from the LNU were kept. Additional questions regarding health status and assistance were added, as were tests of physical and cognitive function.

The response rates in the LNU surveys have decreased from 91% in 1968 to 77% in 2000. Response rates in the SWEOLD studies were 96% in 1992, 89% in 2002 and 87% in 2004 (note that the data collection in 2004 had a wider age range (69+) and was conducted by telephone).

## 5.2 MEASUREMENTS

### 5.2.1 Leisure activities

Leisure activities were measured using a list of activities preceded by the question “Do you usually engage in any of these activities?” The question covered the past twelve months. Possible answers were “No”, “Yes, sometimes” and “Yes, often.” Involvement in organizations and attendance at religious services were measured separately. Membership in several different organizations (e.g., political, religious and retiree) was inquired about, followed by a question regarding the frequency of participation in these organizations. Attendance at religious services was measured in a similar way. Response alternatives ranged from “No” to “Once a week or more”, recoded into three categories to correspond with the other activities. The list of activities was put together at the survey’s inception in 1968, although a few additions have been made later on. Table 1 lists all leisure activities that were included in Studies I–IV, with information about when they were measured.

Table 1. Leisure activities in Studies I-IV from the LNU and SWEOLD surveys

	1968	1981	1991	1992	2002
Reading books	X	X	X	X	X
Reading daily papers				X	X
Gardening	X	X	X	X	X
Taking walks				X	X
Study circles	X	X	X	X	X
Cultural activities <sup>a</sup>	X	X	X	X	X
Hobby activities	X	X	X	X	X
Solving crossword puzzles				X	X
Dancing	X	X	X	X	X
Fishing, hunting <sup>b</sup>	X	X	X	X	X
Restaurant visits	X	X	X	X	X
Musical activities <sup>c</sup>			X	X	X
Religious services	X	X	X	X	X
Organizational activities <sup>d</sup>			X	X	X

<sup>a</sup> In LNU surveys, “cultural activities” consisted of two separate items: going to the cinema and going to the theater, concerts, museums and art exhibitions. They were merged in the SWEOLD studies.

<sup>b</sup> In LNU surveys, “fishing, hunting” were two separate items.

<sup>c</sup> “Musical activities” consists of playing a musical instrument and/or singing in a choir. These two items were merged into one in 2002. Only survey-years including both items are marked.

<sup>d</sup> Questions regarding organizational membership were asked also in 1968 and 1981, but there was no comparable measure of overall participation in organizational activities.



### 5.2.2 Mortality

Studies III and IV used mortality as an outcome. Follow-up on vital status was done with the Swedish National Cause of Deaths Register which maintains records of death certificates. Time under risk was measured in days from the time of the interview until date of death or censoring; those who were still alive at the end of the follow-up were censored.

### 5.2.3 Covariates

*Age* and *gender* were included in all four studies. Information was gathered from population registers and confirmed during the interview.

*Education* was included as a measure of socioeconomic position in all four studies, although with slightly different dichotomizations. Education was measured both as years of schooling and highest degree achieved. In Studies I, II and IV, dichotomizations were made based on the level of education achieved, into basic education (no more than grade school) or beyond basic education (beyond grade school). Study III used years of education for dichotomization into less than eight years of schooling or eight or more years. This dichotomization corresponds fairly well to basic education and beyond basic education for these cohorts.

Study I included *living situation* coded as “living alone” or “living with others.” Most of those who lived with another person lived with a spouse; a few lived with children or siblings.

In Studies I and II, *mobility* was measured as an index of the self-reported ability to stand without support, to rise from a chair, to walk a hundred meters without difficulty and to go up and down stairs without problems. This index was dichotomized into good (no limitations) or impaired (at least one limitation). Although much information is lost in this dichotomization, the greatest difference is likely between persons with and without limitations. In Studies III and IV, mobility was measured with a single item regarding the self-reported ability to walk a hundred meters without difficulty. Possible answers were yes and no.

Studies I and III included statistical controls for fatigue (I and III), shortness of breath (III), diabetes (III), depression (III) and myocardial infarction (III) taken from a list of common diseases and symptoms with the question, “Have you had any of the following diseases or disorders during the last 12 months?” The answers were “No”, “Yes, mild” and “Yes, severe”, dichotomized into no or yes.

In Studies II and IV, *vision* was measured subjectively with the question, “Can you read a newspaper without difficulties?” The answers were dichotomized into good vision (“Yes, with or without glasses”) and impaired vision (“No, have certain difficulties” and “No, not at all”). This item was measured in 2002. Study IV also included a measure of vision from 1981, measured with a question about “having poor vision or an eye disease not substantially improved by glasses.” Answers were “No”, “Yes, slight” and “Yes, severe”, dichotomized into no or yes.

Studies II and IV used a measure of cognitive status measured in 2002 with a validated short version of the Mini Mental State Examination (MMSE) (Folstein, Folstein, & McHugh, 1975; Parker, Gatz, & Thorslund, 1996). The range of the shortened scale was 0–11, dichotomized into good cognition (equal to or higher than the cutoff of 7) and impaired cognition (lower than 7). This cutoff is equivalent to the typical MMSE cutoff of 23 or lower for cognitive impairment (Gatz et al., 2005). Due to the inclusion of indirect and telephone interviews, some individuals lacked data on the MMSE. Interview notes explaining the reason for proxy interviews revealed that many missing cases were due to cognitive impairment. In order to minimize the number of internal missing, a separate category was created for individuals for whom there was no information about cognitive status. Cognition was therefore divided into three categories: good cognition, impaired cognition and no information on cognition.

Study IV used an index of *circulatory problems* consisting of chest pain, high blood pressure, heart weakness and dizziness. The answers were coded as 0 (no), 1 (yes, slight) and 3 (yes, severe). After adding the four items, a dichotomous variable was constructed whereby three or more points (three slight or one severe problem) *or* myocardial infarction during the past 12 months was categorized as having circulatory problems. This index has been used as an indicator of morbidity in other studies (Lundberg, 1990; Thorslund & Lundberg, 1994).

In Study IV smoking and physical activity were included as lifestyle indicators. *Smoking* was measured with the question “Do you smoke or have you previously smoked?” with four response alternatives. Answers were dichotomized into currently smoking and not currently smoking. *Physical activity* was measured with a question about taking walks. Response alternatives were “No”, “Yes, sometimes” and “Yes, often”, dichotomized into physically active if taking walks often and physically inactive if taking walks sometimes or never.

### 5.3 STATISTICAL ANALYSES

SPSS was used for almost all analyses. Chi-square tests were conducted in all four studies to analyze group differences. Study I used ordered logistic regressions. Ordered logistic regressions allow the use of a dependent variable with several categories. The categories must be ordered, but the intervals do not need to be equal. Study II used logistic regressions. Study III and Study IV analyzed mortality risk using Cox proportional hazard regressions (Cox, 1972). In Study IV preliminary analyses of mortality risk using Cox regressions did not in all instances fulfill the assumption of proportionality of hazard rates over time. In these cases, analyses were rerun with Stata loosening the assumption of proportionality over time by including interaction terms between time and participation. In these analyses time was effect coded (Pedhazur, 1982), giving an estimate of the average mortality risk difference controlling for non-proportionality.

#### **5.4 ETHICAL APPROVAL**

SWEOLD 1992 was approved by the Ethics Committee of the Uppsala University Hospital, Dnr 247/91. SWEOLD 2002 and the Level of Living Surveys were approved by the Ethics Committee of Karolinska Institutet, KI Dnr 03-413.

## **6 OVERVIEW OF STUDY RESULTS**

### **6.1 STUDY I**

#### **Are today's older people more active than their predecessors? Participation in leisure-time activities in Sweden in 1992 and 2002**

In the first study the aims were to investigate correlates of leisure participation among older individuals (aged 77 and older) and examine differences and similarities in the level of leisure participation between two cohorts of older individuals.

The analyses were based on the community dwelling individuals in SWEOLD 1992 (n=468) and SWEOLD 2002 (n=479). Fourteen leisure activities were divided into four activity groups (social and cultural activities, physical activities, intellectual activities, and expressive and religious activities) as well as combined into a measure of overall participation in leisure activities. Age, living situation, educational level, mobility and fatigue were controlled for in the analyses. Ordered logistic regressions were used to analyze the data.

Results showed that older individuals in 2002 were more active than older individuals ten years earlier. The largest difference was found for social and cultural activities; the more recent cohort participated almost twice as much. Among women, increases were also found in physical activities and intellectual activities. The higher level of leisure participation was not due to improvements in health, since health status was worse in the more recent cohort. Results suggest higher participation levels among more recent cohorts of older adults.

### **6.2 STUDY II**

#### **Continuity of leisure participation from middle age to old age**

In Study II, the objective was to examine changes in different kinds of leisure activities in aging individuals from middle age to old age, from the perspective of continuity theory.

Individuals who were interviewed in LNU 1968, LNU 1991 or SWEOLD 1992, and SWEOLD 2002 (n=495) were included in the analyses. Nine leisure activities were analyzed separately both on the intra-individual and the inter-individual level. Control variables were age, gender, level of education, mobility, vision and cognitive status. Logistic regressions were used to analyze the data.

Results showed that on the inter-individual level, declining participation in leisure activities was the most common pattern upon entering old age. However, on the intra-individual level, those who participated in leisure activities in old age commonly also participated earlier in life. Earlier participation was more important than late-life functional ability for leisure participation in old age. Results seem to

support the continuity theory—leisure participation in old age is often a continuation of previous participation, although there is considerable variation between individuals and activities.

### **6.3 STUDY III**

#### **Leisure activities and mortality: Does gender matter?**

In Study III, the perspective shifts from leisure activities *per se* to the consequences of leisure activities. The aim in Study III was to study the association between leisure activities and survival among older individuals (aged 65 and older), focusing on differences and similarities between older men and women in the association between leisure activities and survival.

Data from LNU 1991 (ages 65 and older) and SWEOLD 1992 were used (n=1246), with a 12-year follow-up for mortality. Twelve leisure activities were analyzed both separately and combined as a measure of overall leisure participation. Age, educational level and six indicators of health status (mobility, fatigue, shortness of breath, diabetes, depression and myocardial infarction) were controlled for in the analyses. Cox proportional hazard regressions were used to analyze mortality risk. Time under risk was measured in days.

According to the results, participating in only a few activities doubled mortality risk compared to those with the highest participation levels, even after controlling for age, education and health indicators. There seem to be gender differences in the association between leisure activities and mortality. Associations between overall leisure participation and mortality are stronger for women than men. Women seem to benefit most from participation in social activities such as organizational activities and study circles. Men seem to benefit from participation in solitary activities such as gardening and hobby activities

### **6.4 STUDY IV**

#### **Do benefits of leisure activities accumulate from middle age to late life? The effects of recent and earlier participation on survival**

The fourth study examined effects of both earlier and recent leisure activities on survival among older individuals (aged 77 and older), thereby investigating the disuse and reserve (or cumulative advantage and disadvantage) hypotheses.

The sample consisted of individuals interviewed in LNU 1981, LNU 1991 or SWEOLD 1992, and SWEOLD 2002 (n=457), with an additional 4.5-year follow-up for mortality. Six leisure activities were analyzed separately, both as recent participation (measured in 2002) and earlier participation (measured in 1981 and 1991/1992). Control variables were age, educational level, health status in 1981 (mobility, vision and circulation), changes in health status 1981–2002, cognitive status in 2002 and lifestyle factors (smoking and physical activity) in 2002. Cox

proportional hazard regressions were used to analyze mortality risk. Time under risk was measured in days.

Stronger associations were found between recent leisure participation and survival than earlier participation, especially for men. Results remained after controlling for age, education, health indicators, changes in health status, and lifestyle. Among men, only recent participation in cultural activities, reading books and gardening was associated with a lower mortality risk, controlling for all covariates. Among women, earlier participation in study groups and religious services and recent engagement in hobby activities were associated with a lower mortality risk when all control variables were considered. Men seem to benefit from recent participation in leisure activities, in line with the disuse hypothesis; while women benefit from earlier participation, supporting the reserve hypothesis.

## 7 DISCUSSION OF THE FINDINGS

### 7.1 THEORY AND ITS LIMITS

Late life is characterized by increased heterogeneity when it comes to health, habits, living conditions, interests, activities and many other domains. Yet, the picture of a homogenous elderly population persists. Attempts have been made to develop a “grand theory” of aging, but without much success, perhaps because of the diversity in the elderly population. Still, making use of theory to help explain and better understand human behavior is important, and theories constitute a valuable framework for studying aging-related phenomena (Bengtson, Rice, & Johnson, 1999).

As mentioned, several theories have attempted to describe the patterns of change (or continuity) in activities and preferences that people go through as they age. Some theories are normative in that they have applied contemporary norms of what old age should be like, while others may have been formulated based on observations in non-representative samples. Common to most theories is the assumption that they are applicable to populations across time, which may not be self-evident.

The basic assumption of the continuity theory of aging is that middle-aged and older adults tend to maintain patterns of activities, thoughts and habits as they age (Atchley, 1989, 1999). Continuity is the most common strategy for adapting to aging and aging-related transitions. Study II used the continuity theory as a theoretical framework to investigate changes in leisure participation from middle age to late life. At present, this is probably the study with the longest follow-up time (34 years) investigating intra-individual changes in leisure participation over time. In accordance with the continuity theory, results showed that leisure participation in late life is commonly preceded by participation earlier in life. Other studies have also reported a large degree of continuity and consistency in individuals’ leisure participation with increasing age (Atchley, 1999; Strain et al., 2002; Verbrugge et al., 1996). Similar findings have been reported for social relationships and friendships (Antonucci, 1990; Field, 1999).

When interpreting descriptive results of longitudinal analyses, common sources of misinterpretations, such as cohort-centrism and the compositional fallacy, may add new dimensions and alternative explanations. Although the activity patterns displayed by the birth cohorts in Study II seem to fit well with the assumptions of continuity theory, this does not necessarily imply that earlier and later cohorts display similar patterns. It is easy to assume that all cohorts age the same way as the cohort under study (in all domains, not only related to leisure participation), but changes in the envioning society have been found to affect the aging process significantly. Disregarding this fact may lead to serious misinterpretations (Riley, 1973; Riley & Riley, 1999). Thus, future cohorts may not display continuous patterns when it comes to leisure engagements; instead, they may be more innovative, seeking new activities and challenges. Similarly, perhaps past cohorts did not display continuous patterns either; instead, maybe they did in fact disengage, as suggested by Cumming and Henry (1961). Social and cultural norms and expectations

regarding age-appropriate behaviors may also play a role in shaping old-age activities and behaviors. Theories may therefore be both temporally and culturally bound.

An interesting approach would be to compare cohorts over time to examine longitudinal cohort differences. Are gerontological theories universal over time, or are individuals and cohorts shaped by early life circumstances and their embeddedness in time and place in relation to important historical events, as suggested by the life course principles (Elder et al., 2003)? Cross-fertilizing gerontological theories with the basic principles of life course theory could perhaps help to alleviate some of the shortcomings. Cross-national studies can also be helpful in shedding further light on a theory's universality.

Another source of misinterpretation in longitudinal studies, where individuals are followed over extended time periods and into very old age, is the changing composition of a cohort with increasing age due to selective mortality (Riley, 1973). In relation to Study II, the continuous patterns may thus depend on the larger proportion of women or of healthier individuals, as these characteristics are likely to be overrepresented in longitudinal samples of older individuals. An alternative interpretation could therefore be that continuous adaptation strategies, as suggested by continuity theory, are more common among healthier individuals or among women. On the other hand, we found no interactions between gender and participation patterns over time, nor did health and functional status in old age modify the influence of previous participation on late-life participation. Studies have shown that respondents in longitudinal studies have slightly higher participation levels at each wave of measurement compared to those who drop out (Atchley, 1999; Li & Ferraro, 2005). It is quite possible that persons with discontinuous activity patterns, who may also be the least well-adapted, are over-represented among the non-respondents.

Surprisingly, men and women, and different age and educational groups, did not differ with regard to change in leisure activities over time, similar to other study results (Strain et al., 2002). This may in part be due to selective survival; again, perhaps the survivors are also the most well-adapted (i.e., those who are able to maintain continuous patterns).

Another way of viewing continuity is the model of selective optimization with compensation (Baltes & Baltes, 1990), according to which aging individuals show a great deal of adaptive capacity. Although findings from Study II may to a certain extent be indicative of the process of selective optimization with compensation, the available data did not allow for closer investigation.

In any case, it is important to acknowledge the diversity in leisure participation with increasing age and the fact that individuals continue, initiate and cease activities.



## 7.2 THE NEW OLD?

Today's older people have had more time and resources to participate in leisure activities earlier in life than previous generations. They also have a greater variety of activities to choose from in old age as both the availability and accessibility of leisure activities have increased. The phrase "when times change, lives change" (Elder et al., 2003, p. 14) concisely captures an important point in life course theory: to get a holistic view of individuals' lives and their aging, it is important to consider contextual factors over the life course.

In Study I, the later cohort of older people (77 and older in 2002) participated more in leisure activities than their predecessors (in 1992). These results are in line with those reported by Tåhlin (1987) regarding a steady increase in rates of leisure participation during 1968–1981 for the general Swedish population. These findings, in combination with studies and forecasts from other countries (Broese van Groenou, 2006; Huber & Skidmore, 2003), suggest that the common assertion that the "new old" are a more active and resourceful group of older individuals, different from previous elderly cohorts, is accurate. Although the cohorts investigated in Study I are older than the cohorts referred to as the new old, the trend of increasing participation levels in more recent cohorts is indicative of the change at hand.

However, although younger cohorts of older individuals may differ in their leisure engagements, recent societal changes with regard to accessibility and availability of leisure resources cannot be overlooked. For example, in recent years many new restaurants have opened in Sweden, primarily in urban areas but also in other parts, and it is more common to eat out now than it used to be. Prices are likely more affordable. These changes most likely have a great impact on results in Study I. Had it been possible to include a measure of "societal change" in the statistical analyses, much of the differences in participation rates between the two cohorts may well have disappeared. As older individuals' participation rates are more sensitive to accessibility issues than younger individuals', we may in part be dealing with an age-specific period effect (which according to previous chapters may only differ marginally from cohort effects).

These cohort and period changes may differ between urban and rural areas. For example, urbanization has led to differences in age composition between urban and rural areas, and there are also differences and changes with regard to the availability of cultural and social activities. It may also be that increases have been greater in some groups of older adults, while others may in fact have experienced a decline. Indeed, results from Study I as well as other studies, suggest that the increase in leisure activities in more recent cohorts coincides with a worsening of health (Broese van Groenou, 2006; Parker, Ahacic, & Thorslund, 2005). This could be interpreted in terms of greater accessibility which may facilitate participation especially for those in poor health and function, or in terms of loosening norms making it more socially acceptable for individuals with disabilities to participate in leisure activities. The weaker association between activities and health in the later cohort is also in line with research showing that the relationship between health and disability seems to weaken over time (Parker & Thorslund, 2007).

As society becomes more individualized, less organized leisure activities have been shown to be increasing at the expense of “collective activities”, such as organizational and civic engagement in studies of the general population. Findings from Study I do not show declines in organizational participation in the elderly cohorts studied. This may be a reflection of the values of these very old age groups whose values are still well-anchored in the collective society. Future surveys may observe this trend even among very old people.

Period effects may also be involved in Study II. The continuous patterns of leisure participation from middle age to old age may in fact be due to the societal changes referred to above. An alternative interpretation is that the continuous participation patterns are simply a reflection of increased availability and accessibility of leisure activities as the sample approached very old age. Habits could be maintained because of these changes; otherwise, disengagement might have been the natural adaptive strategy.

Disentangling effects of age, period and cohort is an arduous task due to the interconnectedness of the concepts; some even say it is nearly impossible (Glenn, 2005). Studies I and II investigated cohort differences and effects of aging, respectively. Results from both studies are most likely influenced by period effects which complicate interpretation of results.

### **7.3 HEALTH EFFECTS**

As mentioned earlier, beneficial effects of different leisure activities have been reported in relation to for example cardiovascular disease, physical and cognitive function and survival. Results are not always conclusive, in part due to differing definitions and operationalizations of leisure activity categories and social integration, but also because of varying follow-up times and sample characteristics such as age (and age range), gender (men and women analyzed together or separately) and socioeconomic status. The influence of length of follow-up and the age of the sample will be discussed in section 7.4.3. Another factor that may influence results of studies investigating certain health outcomes is that the reduced host resistance resulting from a sedentary and socially isolated lifestyle may have different manifestations due to inter-individual variations in vulnerability (Seeman, 1996). Thus some individuals may develop cardiovascular disease, while others experience psychological problems and yet others may have psychosomatic symptoms. Assuming that the effects (positive or negative) of activities and social integration work through processes that accumulate over long periods of time, mortality—especially premature mortality—may be the best measure of vulnerability or reduced host resistance. Results regarding the effects of activities, primarily social activities, on survival are indeed the most consistent (Seeman & Crimmins, 2001).

#### **7.3.1 Effects of the studied activities**

In Studies III and IV, several different activities were investigated in relation to survival. Among the activities were book reading, hobby activities, gardening, cultural activities, study circles, religious services and organizational activities—all of which

can be assumed to influence health and thereby survival in similar yet slightly different ways.

For most activities several pathways operate simultaneously. For example, gardening has a physical component, but can also entail creativity, relaxation and stress reduction and provide feelings of usefulness and self-efficacy. Participating in study circles, religious services and organizational activities in most cases involve social interactions with potential for increased social networks. These in turn affect access to different kinds of social support, with improved stress management as a result, and also influence health behaviors. These activities, as most other activities, also involve transportation to and from the activity venue, and although the required physical effort may only be light to moderate, studies suggest that even light to moderate physical activity may be sufficient for a health effect (LaCroix et al., 1996; Mensink et al., 1999). For all activities, psychosocial and behavioral consequences affect the physiological system and thereby “get under the skin”.

As Studies III and IV use samples with different age ranges and also have different length of follow-up, results are difficult to compare. In addition, hazard ratios for recent activities in Study IV are controlled for previous activities, and thereby not really comparable. Nevertheless, some general patterns can be seen. In general, women seem to benefit more from activities that involve contact with other people while men seem to benefit from solitary activities. However, this does not imply that men do not benefit from social activities or women from solitary activities. Similar results were reported in a study of social support, where the receipt of non-assistance-related support (including experiences of emotional closeness and sense of belonging) lowered mortality risk among older women while no associations between any social support dimensions and mortality were found among men (Lyyra & Heikkinen, 2006).

In Study IV late-life health behaviors (smoking and physical activity) were included in the analyses to see if lifestyle mediated the effect of activities on survival. Health behaviors were included in the analyses after health and cognitive status, and had only marginal effects on the results. As the effect of health behaviors on survival is mediated through health, health is a much stronger predictor and may thus overshadow the effect of health behaviors. Also, as this is a very old sample (aged 77 and above), the effects of health behaviors may already have influenced who has died and who is still alive, suggesting that selection mechanisms may play a role. The longitudinal character of the sample, following individuals for about twenty years with regard to activities and health, also suggests that this is indeed a selected group. In preliminary analyses (not shown) earlier health behaviors were also investigated, but were excluded as in most cases they had no effect, which again suggests that the sample is indeed a selected group. Selection bias will be further discussed in section 7.4.2.

### **7.3.2 Cumulative or immediate health effects?**

Most studies investigating health and survival effects of activities use information from one time point followed by a follow-up period for investigating the outcome

in question (hospitalizations, mortality, etc.). These studies cannot differentiate between immediate and potentially cumulative effects of activities. In recent years many longitudinal studies of middle and old age have emerged. These can be helpful in examining longitudinal effects of activities as well as the bi-directionality of the association between activities and health, an issue that is particularly crucial when studying older adults as morbidity and mortality rates are so high.

Leisure activities can have both immediate and cumulative effects; they are not mutually exclusive. In fact, it is reasonable to assume that most activities have immediate effects of some kind (such as stress reduction, self-efficacy and feelings of usefulness, in many cases translated into physiological effects), while only some activities have the potential for cumulative effects if continuously practiced. Likewise, the reserve and disuse hypotheses are not necessarily mutually exclusive; rather, they may be differently applicable across different kinds of activities and groups of individuals.

In Study IV, measures of earlier and recent leisure activities were investigated separately in an attempt to separate their effects. Results differed for men and women, and for different activities. While earlier activities (those involving social interactions) influenced survival independently of recent activities among women, men seemed only to benefit from recent activities (controlling for earlier activities and several indicators of health and health change). This modest effect of earlier activities may be indicative of sample selection and the old age of the sample; potentially cumulative effects of activities (and advantages and disadvantages in general) may be more prominent for premature mortality. Similar to our findings, a study of earlier and recent social conditions (focusing on disadvantages) in early old age found only modest effects of earlier conditions in favor of recent conditions (Naess, Hernes, & Blane, 2006).

Although it has been proposed that long-term participation in activities throughout the life course may have cumulative benefits reaching beyond those gained from sporadic participation (Bassey, 2000; Fratiglioni et al., 2004; Klumb & Maier, 2007), few studies have investigated the issue. Two studies investigating volunteer activities found that individuals who continuously volunteered over a period of about seven years had greater health benefits in terms of depressive symptoms than others, interpreted as a potential cumulative effect (Li & Ferraro, 2005; Musick & Wilson, 2003). Those who only volunteered at the last measurement-point had more depressive symptoms than others, indicating that the proposed cumulative effect was not driven by recent volunteering (Musick & Wilson, 2003). Similarly, an eleven-year study investigating physical activity and subsequent cognition among middle-aged individuals found a graded linear association between physical activity and cognition (particularly fluid intelligence), with decreasing scores ranging from the continuously active to the continuously sedentary (Singh-Manoux et al., 2005).

Consistent with results for women in Study IV, these studies suggest that continuously active individuals seem to age with better health (Li & Ferraro, 2005; Musick & Wilson, 2003), suggestive of a general host resistance. This is in line with the reserve hypothesis and the hypothesis of cumulative advantages. Thus continuously

active individuals may be better prepared to face the challenges of aging and cope with the stress incurred by the life transitions of old age, mainly due to greater access to social support but to some extent also to physical advantages because of participation in physical activities.

Results for men in Study IV, along with other longitudinal studies, seem to support the disuse hypothesis that once activities are stopped, positive health effects gradually diminish; although in many cases the reason for ceasing participation may be declining health, especially among older individuals. In a sixteen-year longitudinal study of physical activities and disability, individuals who increased exercise levels had disability levels similar to the continuous exercisers, while those who decreased physical activities had disability levels similar to continuously sedentary persons (Berk, Hubert, & Fries, 2006). Studies with repeated measures of physical activity and subsequent mortality suggest that recent activity levels are more important than earlier levels, even among older individuals. Increasing activity levels were associated with mortality risks comparable to those of the continuously active, while decreasing levels were similar to those of the continuously sedentary (Bijnen et al., 1999; Gregg et al., 2003; Schnohr et al., 2003). Other activities have also been studied with similar results: decreasing or maintaining a low level of cultural activity was associated with worse perceived health compared to those reporting continuously high levels, while those who increased activity levels were similar to the continuously active (Johansson, Konlaan, & Bygren, 2001).

It seems the disuse hypothesis may be applicable to certain kinds of activities, particularly physical activities, where beneficial effects slowly fade once participation is stopped (Berk et al., 2006; Gregg et al., 2003; Schnohr et al., 2003), while effects of other types of activities, such as social engagement, may accumulate in accordance with the reserve and accumulation hypotheses (Li & Ferraro, 2005; Musick & Wilson, 2003).

According to the hypothesis of cumulative advantages and disadvantages, there may be sensitive periods during which individuals are more vulnerable (Ben-Shlomo & Kuh, 2002; Kuh et al., 2003). Accordingly, activities may be more beneficial during these sensitive periods. In the context of old age, sensitive periods may be the transitional phases of retirement, bereavement or the onset of disability. Indeed, these transitions potentially constitute stressful life events which may influence mental health (Glass, Kasl, & Berkman, 1997). Therefore, the preservation of activities and social support networks may be particularly imperative during these transitional phases.

#### **7.4 CHALLENGES WHEN STUDYING ACTIVITIES AND HEALTH**

Several issues warrant caution when investigating the association between activities and health (or survival). These issues are especially evident when older individuals are studied because of their higher rates of morbidity and mortality.

### **7.4.1 Reverse causality**

A critical and important issue when studying leisure activities is reverse causality suggesting that the association between activities and health is more strongly driven from health to activities than the other way around. Healthier individuals tend to participate in leisure activities to a greater extent, and may also be more inclined to have a more regular participation pattern and higher intensity. For older individuals in particular, the association between activities and health is most likely bi-directional, with healthier individuals being more active (at least in some types of activities) which in turn affects health and function.

From a life course perspective it may be argued that active individuals enter old age with more favorable circumstances: they have established habits of activity, are more likely to have wider social networks and beneficial health behaviors, as well as better health in general. These circumstances form a foundation that facilitates continued participation in activities, which in turn further promotes their health. Correspondingly, a socially isolated and sedentary lifestyle may affect health and well-being negatively which in turn would create additional barriers for engaging in activities.

### **7.4.2 Selection bias and confounders**

Another factor that may influence results in studies of leisure activities and health is selection bias. Selection bias may be due to non-representative study samples; that is, the study sample may consist mostly of active people as they may be more interested to participate in the study; or in the case of longitudinal studies, the respondents may be both healthier and more active than the attrition (dropouts and deceased). Selection bias may also be due to selective mortality, which is primarily relevant in older samples as individuals who die “prematurely” are often selected in some ways. In the case of the association between activities and health, inactive individuals as well as those in worse health are likely to have higher mortality risks than the active and healthy individuals. Results of Study IV were likely affected by selection effects, as the sample was followed over twenty years into advanced ages (77 and older). In a longitudinal study of volunteer activities and depression, selection effects due to attrition were investigated. Results showed that those who participated in all three waves of data collection engaged in volunteer activities to a greater extent and also experienced less depressive symptoms (Li & Ferraro, 2005). Survey participants were thus both healthier and more active. Since there is an under-representation of both the less active and those in worse health, the results are attenuated compared to the true values.

Yet another issue that complicates epidemiological studies is confounding. A confounder is a factor that is associated with both the independent and dependent variables and thus distorts the association if it is not included in the analyses. A confounder should not be an effect of the independent variable (Rothman, 2002). In the case of leisure activities and health, a possible confounder is socioeconomic status, which affects both activities and health. If socioeconomic status were affected by activity level, which we assume it is not, it would not be a confounder.

### **7.4.3 The role of age and follow-up time**

The age of the sample and the duration of follow-up are other factors that may influence study results, although they are often disregarded. Both the average age and age range of the study population at the time of measurement influence results. Do leisure activities have greater health effects at certain ages? With a life course approach to leisure participation, the potentially cumulative effect of leisure activities (expanding the social network, encouraging healthy behaviors and promoting host resistance) may be more affected by active leisure participation at earlier stages in life because of the potentially longer “incubation time”. At the same time, the immediate benefits of leisure activities should be present independently of age, as suggested by several studies (see for example Berk et al., 2006). Still, beneficial effects found for one age group may not be generalizable to other age groups; results from studies of newly retired adults (aged around 65) may not hold for older individuals (75+). As discussed above, the risk for selection effects, for example due to selective mortality, increases with age.

The duration of follow-up is also important. While it is an advantage to have a long follow-up period in order to let the effects of activities get under the skin, the downside is that participation levels, health status and the life situation as a whole may change—and quite drastically when older individuals are concerned. So although a longer follow-up time may result in more “cases” (at least when studying mortality) and thereby more statistical power, a shorter follow-up period may give more precise risk estimates (Meinow et al., 2004). Studies with longer follow-up periods would benefit from accounting for changes in participation levels and health status whenever possible.

Differences between findings in Study III and Study IV may partly be due to differing sample age and follow-up time. The six activities that were included in Study IV were also included in Study III, which allows for comparisons.

Individuals included in Study III are supposedly a representative sample of the Swedish population aged 65 and above, while Study IV respondents are more select due to the longitudinal character of the sample and the higher age (77 and above). Thus results in Study IV are likely to be attenuated because the most active individuals and those in good health are overrepresented. Sample sizes and follow-up time also differ, which causes statistical power issues. In addition, control variables differ between the studies, so that the effect of recent leisure participation in Study IV is controlled for previous participation already at inclusion. Results for several activities differ between Study III and Study IV, which further highlights the importance of considering these methodological issues when comparing studies.

## **7.5 METHODOLOGICAL STRENGTHS AND LIMITATIONS**

### **7.5.1 Response-rate and selection**

Because of the generally high response-rates in the Level of Living and SWEOLD studies and their nationally representative character, they constitute a solid basis for

research. However, when making use of the longitudinal character of the sample, some methodological issues relating to selection and generalizability need to be addressed.

As already discussed in previous sections, selection bias may influence results, particularly in longitudinal studies. In the longitudinal samples of Studies II and IV, selective mortality and attrition have likely influenced the study samples. In Study II, data from LNU 1968, LNU 1991 or SWEOLD 1992 and SWEOLD 2002 were used. Non-response in the relevant age-groups (aged 43-65 in 1968) among those still alive in 2002 was 11% in 1968, and attrition in the following studies 23%. Corresponding figures of non-response for Study IV using data from LNU 1981, LNU 1991 or SWEOLD 1992 and SWEOLD 2002 were 27% among those aged 56-75 in 1981 with subsequent attrition of 15%. In the case of Study II, it may be that the most active individuals, perhaps also being those displaying most continuous patterns, are over-represented. In that case, the maintenance of continuous patterns may be overestimated, as discussed in section 7.1. In the case of Study IV, the most active and those in better health are likely over-represented, thus the association between activities and survival will be attenuated. Considering the high response-rates, particularly in the SWEOLD samples, the effect of selective attrition is likely rather small. This was confirmed by analyses comparing respondents and non-respondents in SWEOLD 2002: no differences were found in health status in 1968, controlling for age, gender and education (unpublished analyses). Nevertheless, it is impossible to completely remove selection bias from longitudinal samples, as the respondents are often more active and healthy compared to the population as a whole.

In Study I, 89 persons (9%) were included in both SWEOLD 1992 and 2002. Repeated measures on the same persons could lead to erroneously low standard errors and therefore to low  $p$ -values and narrow confidence intervals. Other studies using these two SWEOLD samples (Ahacic et al., 2007; Kåreholt et al., 2004) have investigated a number of different outcomes using the Huber-White sandwich estimator of variance with correction for clustering of observations to control for this overlap. According to the results, the ten-year interval between the studies provides a sufficiently long time period not to get erroneous standard errors.

### **7.5.2 Generalizing results**

Results of Study I are likely generalizable to those specific age cohorts living in Sweden. As rates of leisure participation change over time and differ from one place to another, results of Study I cannot be generalized to other cohorts and countries. The trend of a general increase in leisure activities among older individuals may however be cautiously generalized.

As discussed in section 7.1 above, results of Study II warrant a word of caution. While the continuous patterns are likely generalizable to the cohorts studied, both in Sweden and in other countries (Atchley, 1999), they may not be generalizable to future cohorts. Erroneously inferring results from one age cohort to other cohorts is called the fallacy of cohort-centrism (Riley, 1973).



The associations between activities and survival reported in Studies III and IV may be generalizable to the general older population, but not to frail older individuals although they were not excluded from the study samples. Frail old individuals differ in several ways from the general older population and should probably be analyzed separately. Indeed, in a study that stratified the sample according to baseline health status and age respectively, protective effects of physical activities on survival were smaller for those in poor health and those over the age of 75 (Gregg et al., 2003). On the other hand, a study of long-term care residents (who may be assumed to be frail) showed higher mortality risks among the least socially active compared the most active, even after controlling for a wide range of risk factors (Kiely et al., 2000).

### **7.5.3 Variables – strengths and limitations**

#### ***7.5.3.1 Leisure activities***

The list of leisure activities was put together for the first LNU survey in 1968, with common activities that were considered “resourceful” for the individual. There has been some critique as to whether the included activities are socioeconomically neutral or whether there is a middle-aged, white-collar bias, where activities that are common among individuals with higher socioeconomic status are included to a greater degree than other activities. The exclusion of listening to the radio and watching television, considered by many elderly people to be important leisure activities, may be examples of this bias.

Another factor influencing the content of the activity list is the longitudinal character of the survey. Because it is a longitudinal study, most leisure-activity items have been kept unchanged since the first survey in 1968. While this is an advantage when conducting longitudinal analyses, it also means that activities that have become popular in recent years are not included. Golf, for example, very popular among retirees during the past ten years, is not included. In SWEOLD, especially in 2002 and 2004, some additional activities were added. At the same time, changes or additions in the list of activities creates problems in longitudinal approaches and often excludes them from the analyses.

The white-collar bias may cause a problem for interpreting results from Study I if people in recent years generally engage more in “white-collar” activities (i.e., those captured by the activity list) compared to “blue-collar” activities. In that case, the true activity level would be the same, but according to the data it appears to have increased. However, a more likely scenario is that most newly started activities are such that were not included in the list, such as golf and boules. In that case, the true increase in activity level is larger than that measured.

Measuring leisure activities with a list means individuals are reminded of common activities they may engage in. On the other hand, they may participate in them without considering them to be *leisure* activities; some activities may be performed as any other non-discretionary activity. In other words, what is measured here is the quantity of leisure participation without any information of the individual’s own perception of whether it is considered to be leisure. For the purposes of the present

four studies, this measuring technique is satisfactory although limiting to some extent because of the exclusion of some very common activities.

The positive response alternatives (yes, sometimes and yes, often) may be problematic because of their subjective nature. Different individuals or groups of individuals may put varying meanings in the frequency of “sometimes” and “often”. Also, what may be considered often for book reading may not be the same as often for fishing/hunting. In these studies, participation in leisure activities has been dichotomized into no or yes. Although this gives a rather crude measure, the biggest difference—especially in the older population—is likely between doing nothing and doing something.

This dichotomization into participation and non-participation may still have influenced study results. In Study I for example, a possible scenario is that individuals in the earlier cohort engaged in fewer activities but more often, while those in the later cohort engaged in a wider range of activities but more seldom. The overall activity level is thus unchanged, but because of the dichotomization an increase appears. Additional analyses showed that the reported frequencies of “sometimes” and “often” remained relatively unchanged over the ten-year period (not shown). In Study II the dichotomization may limit variability, but since fluctuating participation levels are within the bounds of a continuous participation pattern it is rather unproblematic. Studies III and IV would have benefited from accurate measures of activity frequency and intensity. These variables were unfortunately not available in the data. The use of crude measures, such as a dichotomized activity variable, makes it more difficult to find statistically significant associations. Thus, results in Studies III and IV are likely attenuated.

### **7.5.3.2 Covariates**

If relevant covariates are not sufficiently controlled for in the statistical analyses, results may be biased by residual confounding. Residual confounding refers to the situation when included confounding factors are measured inaccurately or when there are other confounding factors that are not included in the analyses. Obviously, it is not possible to control for all potential confounders as no dataset can cover all relevant dimensions. This is especially true when the study was originally designed for other purposes, as is the case here. Nevertheless, the Level of Living Surveys and SWEOLD studies cover a wide variety of domains related to health, activity and living conditions, and thus provide a good basis for conducting these studies.

As mentioned, insufficient controls for health status when investigating the association between activities and survival, especially when older individuals are concerned, can give erroneous results as activities and health exert a mutual influence on each other. At the same time, leisure activities are assumed to influence survival by affecting health status, that is, protective effects of activity participation on mortality risk are likely mediated through improved health status. Health status thus serves as both a mediator and a confounder (Christenfeld et al., 2004).

In Study III, indicators of health status were limited to those included in both LNU 1991 and SWEOLD 1992. Appropriate measures of physical and cognitive function (which were only available in SWEOLD data) for capturing these health domains among elderly people could therefore not be included. Separate additional analyses for the SWEOLD sample in Study III were run including statistical control for cognitive status, but did not modify the results. Still, the inclusion of all health indicators that were significantly related to mortality, either among women, men or in the total sample, can be considered a strength. Availability of health indicators in Study IV was also restricted for the same reason; the variable measuring health change over time could only use health items that were included in LNU as well as SWEOLD. Besides health change, Study IV also included recent health status (measured in SWEOLD 2002) and so a measure of cognitive ability could be included. The strength of the health variables in Study IV was the inclusion of three major health domains (mobility, circulation and vision) in combination with change in these variables over the study period as well as recent cognitive status. Preliminary analyses also included an index of psychological distress/depressive symptoms, but since results were not modified by the inclusion of this index it was omitted from the analyses.

The measure of physical activity used in Study IV, taking regular walks, can be considered very crude and does not cover many of the common physical activities older individuals may engage in. However, as it is such a common activity, older individuals who participate in other physical activities are also likely to take regular walks.

#### **7.5.4 Concluding remarks**

In conclusion, all datasets and surveys suffer from certain shortcomings, some of which have been mentioned above. The strengths of the data can also be mentioned. The Level of Living and SWEOLD studies are nationally representative and response-rates have been generally high, especially among the older segments of the sample where response-rates are usually low. Since the inception of the Level of Living survey in 1968, follow-ups have been made with regular intervals. With the addition of the SWEOLD study, there is no longer an upper age limit. Therefore, this longitudinal dataset covering a period of 36 years is rather unique.

## 8 CONCLUSIONS AND IMPLICATIONS

The present results, as well as results from other studies, suggest that coming cohorts of older adults are more resourceful and active compared to previous cohorts. This will increase demands on authorities, as well as organizations, to meet the expanding leisure interests and pursuits of these new cohorts. Attention will need to be given to accessibility issues, such as the accessibility of buildings, public areas and public transport. Issues regarding access to information technology such as computers, internet and cell phones, must be addressed as they have become integral parts of daily life. Also, possible economic barriers to activity participation need to be identified.

Results also suggest that individuals continue their activities from middle age into old age. In order for authorities and organizations to provide appropriate venues and facilities for leisure engagement, it is important to be familiar with the leisure interests and commitments earlier in life. However, future cohorts may not exhibit continuity upon entering old age as the present cohorts do. Rather, they may be more innovative and novelty-seeking, as a response to changing societal norms and expectations.

These results provide further support for the repeatedly reported association between activities and health/survival. Activities seem to promote health even in late life. These findings confirm those of other studies in indicating that effects of certain activities, primarily those involving social interactions, accumulate over time.

These and previous studies highlight the potential benefits of interventions targeting older individuals. Older individuals have often been excluded from health promotion interventions, and preventive measures in health care usually focus on individuals up to middle age. Considering the accumulating evidence suggesting health benefits from activities, especially physical and social activities, health promotion programs directed toward the older population may be worthwhile. In coming years, there may be both interest and potential for health promotion considering the new cohorts that are approaching retirement and old age, and their higher expectations regarding maintaining health, function and quality of life even at advanced ages.

While very old and frail individuals were not excluded from the study samples, care should be taken when generalizing results for these persons. In addition, because of their frail health status and proximity to death, survival is a rather uninteresting outcome for this group. Considering the recent increases in life expectancy and the prolonged survival among those in poor health (Meinow, 2008), studies investigating the potential effects of activities on quality of life and well-being among frail older individuals may be of value for developing appropriate interventions in social services.

Closer investigation of the modifying effects of activities on transitions (such as retirement, bereavement and the onset of disability) is vital in order to facilitate and mitigate the adaptation process. The availability of various resources, such as social services, may be crucial in adapting to the onset of disease or disability.

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## 11 APPENDIX

List of dissertations from the Aging Research Center and the Stockholm Gerontology Research Center, 1991-2008

1991

**Herlitz Agneta.** Remembering in Alzheimer's disease. Utilization of cognitive support. (Umeå University)

1992

**Borell Lena.** The activity life of persons with a dementia disease.

1993

**Fratiglioni Laura.** Epidemiology of Alzheimer's disease. Issues of etiology and validity.

**Almkvist Ove.** Alzheimer's disease and related dementia disorders: Neuropsychological identification, differentiation, and progression.

**Basun Hans.** Biological markers in Alzheimer's disease. Diagnostic implications.

1994

**Grafström Margareta.** The experience of burden in care of elderly persons with dementia. (Karolinska Institutet and Umeå University)

**Holmén Karin.** Loneliness among elderly - Implications for those with cognitive impairment.

**Josephsson Staffan.** Everyday activities as meeting-places in dementia.

**Stigsdotter-Neely Anna.** Memory training in late adulthood: Issues of maintenance, transfer and individual differences.

**Forsell Yvonne.** Depression and dementia in the elderly.

1995

**Mattiasson Anne-Cathrine.** Autonomy in nursing home settings.

**Grut Michaela.** Clinical aspects of cognitive functioning in aging and dementia: Data from a population-based study of very old adults.

1996

**Wahlin Åke.** Episodic memory functioning in very old age: Individual differences and utilization of cognitive support.

**Wills Philippa.** Drug use in the elderly: Who? What? & Why? (Licentiate thesis)

**Lipinska Terzis Beata.** Memory and knowledge in mild Alzheimer's disease.

1997

**Larsson Maria.** Odor and source remembering in adulthood and aging: Influences of semantic activation and item richness.

**Almberg Britt.** Family caregivers experiences of strain in caring for a demented elderly person. (Licentiate thesis)

## 1998

**Agüero-Eklund Hedda.** Natural history of Alzheimer's disease and other dementias. Findings from a population survey.

**Guo Zhenchao.** Blood pressure and dementia in the very old. An epidemiologic study.

**Björk Hassing Linda.** Episodic memory functioning in nonagenarians. Effects of demographic factors, vitamin status, depression and dementia. (In collaboration with the Department of Psychology, University of Gothenburg, Sweden)

**Hillerås Pernilla.** Well-being among the very old. A survey on a sample aged 90 years and above. (Licentiate thesis)

## 1999

**Almberg Britt.** Family caregivers caring for relatives with dementia – Pre- and post-death experiences.

**Robins Wahlin Tarja-Brita.** Cognitive functioning in late senescence. Influences of age and health.

**Zhu Li.** Cerebrovascular disease and dementia. A population-based study.

## 2000

**Hillerås Pernilla.** Well-being among the very old. A survey on a sample aged 90 years and above. (In collaboration with H. M. Queen Sophia University College of Nursing, Stockholm, Sweden)

**von Strauss Eva.** Being old in our society: Health, functional status, and effects of research.

## 2001

**Jansson Wallis.** Family-based dementia care. Experiences from the perspective of spouses and adult children.

**Kabir Nahar Zarina.** The emerging elderly population in Bangladesh: Aspects of their health and social situation.

**Wang Hui-Xin.** The impact of lifestyles on the occurrence of dementia.

## 2002

**Fahlander Kjell.** Cognitive functioning in aging and dementia: The role of psychiatric and somatic factors.

**Giron Maria Stella T.** The rational use of drugs in a population of very old persons.

## 2003

**Jönsson Linus.** Economic evaluation of treatments for Alzheimer's disease.

## 2004

**Berger Anna-Karin.** Old age depression: Occurrence and influence on cognitive functioning in aging and Alzheimer's disease

**Cornelius Christel.** Drug use in the elderly - Risk or protection? Findings from the Kungsholmen project

**Qiu Chengxuan.** The relation of blood pressure to dementia in the elderly: A community-based longitudinal study

**Palmer Katie.** Early detection of Alzheimer's disease and dementia in the general population. Results from the Kungsholmen Project.

**Larsson Kristina.** According to need? Predicting use of formal and informal care in a Swedish urban elderly population. (Stockholm University)

## 2005

**Derwinger Anna.** Develop your memory strategies! Self-generated versus mnemonic strategy training in old age: Maintenance, forgetting, transfer, and age differences.

**De Ronchi Diana.** Education and dementing disorders. The role of schooling in dementia and cognitive impairment.

**Passare Galina.** Drug use and side effects in the elderly. Findings from the Kungsholmen Project.

**Jones Sari.** Cognitive functioning in the preclinical stages of Alzheimer's disease and vascular dementia.

**Karp Anita.** Psychosocial factors in relation to development of dementia in late-life: a life course approach within the Kungsholmen Project.

**Nilsson Jan.** Understanding health-related quality of life in old age. A cross-sectional study of elderly people in rural Bangladesh.

## 2006

**Klarin Inga.** Drug use in the elderly – are quantity and quality compatible.

**Nilsson Erik.** Diabetes and cognitive functioning: The role of age and comorbidity.

**Ngandu Tiia.** Lifestyle-related risk factors in dementia and mild cognitive impairment: A population-based study.

**Jonsson Laukka Erika.** Cognitive functioning during the transition from normal aging to dementia.

## 2007

**Ferdous Tamanna.** Prevalence of malnutrition and determinants of nutritional status among elderly people. A population-based study of rural Bangladesh. (Licentiate thesis)

**Westerbotn Margareta.** Drug use among the very old living in ordinary households- Aspects on well-being, cognitive and functional ability.

**Rehnman Jenny.** The role of gender in face recognition. (Stockholm University)

**Beckman Gyllenstrand Anna.** Medication management and patient compliance in old age.

**Nordberg Gunilla.** Formal and informal care in an urban and a rural population. Who? When? What?

## 2008

**Gavazzeni Joachim.** Age differences in arousal, perception of affective pictures, and emotional memory enhancement. (Stockholm University)

**Marengoni Alessandra.** Prevalence and impact of chronic diseases and multimorbidity in the aging population: A clinical and epidemiological approach.

**Rovio Suvi.** The effect of physical activity and other lifestyle factors on dementia, Alzheimer's disease and structural brain changes.

**Xu Weili.** Diabetes mellitus and the risk of dementia. A population-based study.

**Meinow Bettina.** Capturing health in the elderly population – complex health problems, mortality, and the allocation of home help services. (Stockholm University)