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# Trends in social relations among 70-year olds

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# Abstract

Title: Trends in social relations among 70-year olds.

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Objective:

In recent years there has been an increasing interest in the changing face of ageing. The young-old and the third age has been proposed as new conceptual definitions of healthy post-working and late-life. The objective of this thesis is to analyze changes regarding social relations that can be related to this restructuration of the life-course.


Method and data:

Data on social relations from two cohorts from Gothenburg, Sweden, one born in 1901-2 (N=1007) and the other in 1930 (N=486), both examined at age 70 were analyzed. The analyses used latent class analysis to deduct typologies of social relations divided into two spectrums of social relations, frequency and contentment. These typologies associations with covariates; including among others education, five year mortality and relationship status, were then analyzed with binary and multinomial logistic regression.


Results:

Changes were observed. Primarily these changes were related to a rise in organizational activity, lower levels of social isolation and higher frequencies of mild discontentment with social relations. The typologies of social relations were also structured differently across cohorts. Several obstacles comparing the two cohorts were encountered. Rising expectation on this part of the life-course that is not synchronized with changes in frequency of social relations is proposed as a theoretical explanation for the changes in contentment.


Keyword: social relations, cohort comparison, young-old, the third age.

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# Acknowledgements

# Introduction

In what ways have the social relations of 70-year olds changed in recent decades? This is the general question posed in this study. In recent years there has been an increasing interest in the changing face of aging in the western world due in large part to world population ageing (United Nations 2002). Concepts like the *third age* or the *young old* which try to characterize the relatively new concept of a long and healthy post-working life or late-life have been developed. Writing in the mid-seventies Bernice Neugarten hypothesized that the young old (the age group roughly between 55 and 75) would develop new norms of what it meant to be old especially as the 1990s started and that they would demand much more of society (Neugarten 1974). The historian Laslett sees this as a chance for self-fulfillment which calls for a new definition of healthy post-working life namely *the third age* (Laslett 1989). These new conceptual definitions of late-life are all related to changes in certain vital factors regarding old age, the most obvious is of course the dramatic increase in longevity over the last century. These changes has together with changes in other societal variables such as class composition, divorce rates and education radically altered the composition of the demographic group of 70 -years olds today compared to the 1970s. In the sub-field of social relations one could hypothesize change without being on too thin ice, due to the aforementioned societal changes.

However if changes in social relations have occurred are these just an epiphenomena related to transitions in other variables such as class, health and education, or, can it be found in emergent properties of the demographic cohorts travel thorough the shifting historical space? To what extent can this change be traced to generational properties of different cohorts, their composition or their experience of history? These questions form the outline of this study.

The new demographic factors have in previous studies been shown to impact several dimensions of social relations. In family relations new realties has also called in to question the relationship or contract between different generations, as new family structures develop and economic considerations regarding pensions are changed due to demographic factors. New inequalities among age groups, whether real increases in dependency ratios or perceived

inequities, are causing tensions that could intensify as differences increase (Bengtson 1993). This new phenomena have also created a discussion on whether society has indeed come to terms with the changing age structure of society, or if the societal structure lag behind this new long post-working life (Riley 1994). The changing age structure is perhaps most strikingly seen in the western world; however as the above mentioned UN Report states this is a change that is becoming more accentuated all over the world.

In addition, social networks and relations have been widely discussed and researched for many years; in the late nineteen nineties the declining social capital (manifested in a decrease in certain social relations among individuals) of the United States attracted a lot of attention (Putnam 1995). Several studies have also reported on the connection between health and social networks and relations (Berkman and Syme 1979), specific diseases have also been linked to social networks, like dementia (Fratiglioni, Wang, Ericsson, Maytan, and Winblad 2000). Studies have also been conducted to attempt to disentangle the different types of social networks and their implication for health and mortality (Glass, De Leon, Seeman, and Berkman 1997; Litwin 1998; Wenger 1997) and to explain the connection between social networks and health (Berkman, Glass, Brissette, and Seeman 2000).

The study at hand attempts to analyze the social relations of individuals in two cohorts, one born in 1901-2 and one born in 1930. One of the main questions in this study is to try to disentangle the cohort effect from the effect of different compositional structures, thus observing if their temporal location in history is a vital factor determining their social relations or if this can be explained by the intrinsic characteristics of their composition (i.e. class composition, health, education, poverty etc.). To put it in other words: the study wants to analyze the emergent properties of cohorts and also the predictive potential of concurrent social change. If these changing characteristics of society also give rise to new patterns of social relations that in turn give rise to new functional characteristics of social relations then prior results on these connections might have to be reevaluated.

In light of these questions a brief introduction to the cohorts studied should be given. They are both urban cohorts, interviewed in Gothenburg as parts of the large geriatric surveys that started in 1971 in Gothenburg.

When the first cohort was born Sweden was much poorer country with a population of around 5 million with a mostly rural population dominated by farmers (at the turn of the century 21 % of the population lived in urban areas), 139,370 were born in 1901 and 137,364 in 1902. There was also an emigration surplus. Gothenburg, a port city, was Sweden's second largest city with circa 130 000 inhabitants (SCB 1905a; SCB 1905b; SCB 1999). When the second cohort was born in 1930 Sweden's population had risen to around 6 million but only 94 220 were born this year and Sweden also had a net surplus of immigrants. Gothenburg had 243 414 inhabitants in 1930. The percentage of people living in cities had also risen and was at that time 32 % (SCB 1969; SCB 1999). The change in demographic reality which is perhaps most striking is the low amounts of births in 1930 compared to 1901 and 1902 (see graph 1). This low nativity was much discussed in the 1930s and become the topic of one of the most discussed and influential books in Sweden during that period (*Crisis in the Population Question* [Kris i befolkningsfrågan] written by Alva and Gunnar Myrdal).

When the participants were sampled the situation was different. The population in Gothenburg was 450 419 on December 31st 1971 and in Sweden the population was 8 115 426. The age group between 70 and 74 accounted for 3.9 % of the population (SCB 1972). The seventies were in Gothenburg marked by economic decline, mainly in the shipbuilding industry, however in 1971-72 the full scale of the decline was not yet seen and Sweden and Gothenburg experienced the end of a long period of growth.

On New Year's Eve December 31st 1999 Sweden had a population of 8 861 426 and Gothenburg had a population of 462 470. The age group between 70 and 74 accounted for 4.1 % of the population (SCB 2001). At this time in history Sweden had just recovered from one of the most serious economic crises since the nineteen thirties.
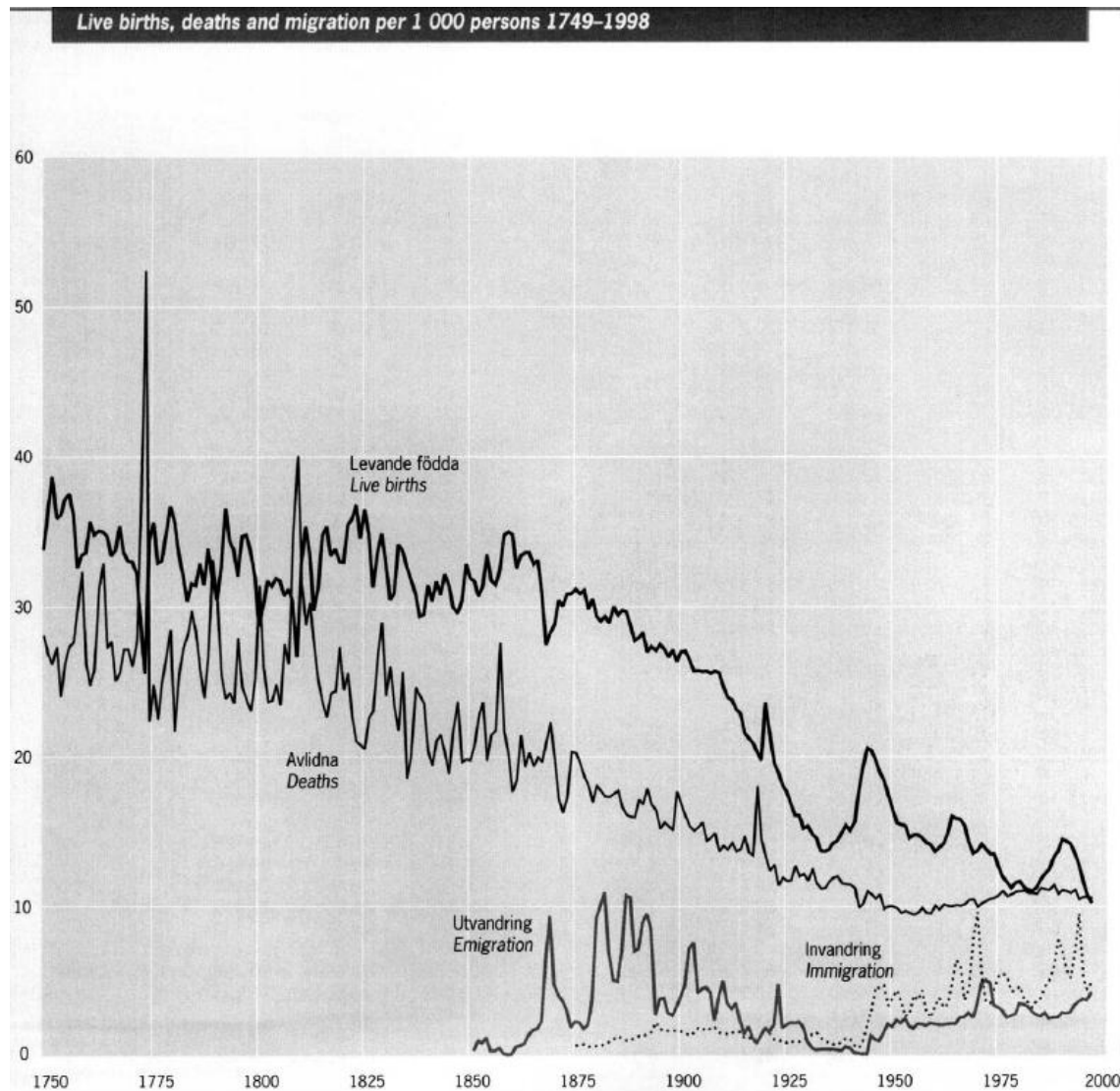
Graph 1: Births and deaths in Sweden 1750-1998 (Source: SCB 1999)

In between these time points of birth and participation in the surveys a myriad of events took place and the life of the two cohorts intersected and some of the younger cohorts probably are the children of the older one. One thing is certain; they did not experience these events at the same ages. Since the life-course is structured the events of history of course influence different cohorts in different ways even though they are contemporaries. This study is interested in the effect of cohort and generation on social relations. Several analytical obstacles were encountered during the course of this study and mostly they were related to the difficulties comparing samples with such great temporal distance especially since methodological change had occurred. There were also problem relating to the fact that

measurements were taken as a part of medical exam and thus not modeled for sociological needs and preferences.

## Objective and outline of the study

The objectives of study in this paper are methodologically structured into three parts based on a comparative study design of social relations across three decades. As was outlined in the introduction these changes have been great and what once Neugarten saw as the new demographic group of the young old could in the early 21st century be more crystallized and one could thus be able to see a change in social relations of the young old when comparing data from the 1970s and the early 21st century. The starting point of this study is the hypothesis of change. However this is a very vague hypothesis and does not specify the research in any directions and opens up to aimless data mining that can be both tedious and ineffective. To substantiate this hypothesis this study sought to parse through this supposed change with a three part methodological design.

Firstly this study aimed to describe the social relations among 70-year olds in Gothenburg Sweden in two different cohorts, one born in 1901-2 and one in 1930. The objective of this being to analyze if changes in society, cohort and health also was reflected in the social relations of 70-year-olds, thus creating a descriptive part of the study. The material was divided into two spectrums of social relations: one *spectrum of contentment,* describing the satisfaction of an individual with their social relations; and one *spectrum of frequency,* describing how often they are involved in social relations. This also made possible a more interesting take on the difference between loneliness as a subjective feeling and social isolation as a matter of frequency of social relations. Sorting the questionnaire dividing it in a way that could be described as a division between objective and subjective parts of social relations, however describing the divide as between *frequency/contentment* was thought to be more informative.

Social relations are interrelated in complex ways that form patterns and to gain a deeper understanding of this patterning of social relations the interrelatedness of the social relations questionnaire was analyzed. To gain a fuller understanding of social relations these patterns

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of social relations form a formidable stepping stone toward a more complex view of change in social relations that move beyond change in individual variables. As a second step the data was therefore analyzed using latent class analysis (LCA) to differentiate different typologies of social relations and to be able to test if social relations are structured differently at the two different time points. At the outset of the study it was thought, in concurrence with Neugarten, that a healthier and perhaps economically more stable environment would lead to higher expectations on social relations and this would perhaps give way to more social relations but could also lead to more discontentments with one's existing relations.

The third part of the study aims to correlate different covariates with the empirically deduced typologies of social relations, thus trying both to analyze the effect of longevity, education and other underlying factors on the different typologies as well as observing if these patterns of effects can be traced over time and if they follow with the changes in social relations typologies. For instance, observing if five-year-mortality has the same effect on social relations of an individual in 2000 as it had in 1971. The covariates chosen to be included in the model were background variables such as gender, relationship status, education, health and whether or not the individuals had grandchildren. As was mentioned in the introduction this is an attempt to analyze if these changes can be parsed out as epiphenomena of social change and whether they in a sense will be predictable. Causality is of course of concern here as correlation between social relations and covariates do not necessarily imply causality. To see if these associations vary over time is an attempt to analyze if different social compositions lead to the changes in the social relations or if there are more fundamental changes in cohort or generational characteristics.

To summarize, the study's goal is to test if change has occurred in the field of social relations. What types of social relations has changed? How is change in composition related to trends in social relations and what cannot be accounted for by change in composition and instead be accounted for by generational factors?

# Theory and earlier research

## Introduction

This study is a study of social relations as an intrinsic part of shifting definitions of the age structure in society. The young old as a concept revolved around "new" old persons that had behaved differently in this part of the life-course than previous cohorts had done. Thus it implies a restructuration of the life-course. It is in this sense a reevaluation how people interpret post-working life in a world where cohorts who reach this age have different experiences and life-world perspectives that limits the planning of their future and also their expectations (Kohli and Meyer 1986). The analytical framework is therefore setup, as Pilcher has noted, at the intersections between biological, societal and generational dimensions of ageing (Pilcher 1995). In the following sections these dimensions of aging will be presented both out of a theoretical outlook but also by presenting earlier research on the subject.

## The changing face of aging

There has, as mentioned in the introduction, been an increasing interest in the changing face of aging in the western world due in large part to world population ageing (United Nations 2002). Connecting this with Pilchers dimensions of aging one can say that the two last dimensions of age and aging, society and cohort, have of course changed. Societies change over the course of history and arguably more than in any other time during the $20^{th}$ century and new cohorts are born all the time. However there has also been a radical change in the first or biological dimension of age. Life-expectancy has soared and most individuals in the Western world can now look forward to circa fifteen years of life after the age of retirement. There has thus been a dramatic change in age and aging during the $20^{th}$ century and it is the intersections of these three dimensions and their associations in the area of social relations that this study seeks to investigate. Perhaps the most dramatic intersection of these dimensions is the interaction between the biological factors and cohort as almost each new cohort has seen a prolonging of life expectancy which creates a new population pyramid when fertility rates drop. This in turn gives a clearer visibility of the aged in the population.

As mentioned, concepts like *the young-old* and *the third age* express this historically new phenomenon of a long and healthy post-working life. Laslett sees it as a chance for self-fulfillment which calls for a new definition of post-working life namely *the third age* (Laslett 1989). What then is the meaning of this in relation to the study at hand? In short one can say since the cohort has the potential of creating new postures of biopsychosocial interaction and that through this the connection to other both intra- and extra individual factors may change. Thus different generation's health status and social relations may show interconnections and emergent properties that did not exist in the other cohorts and that may not be traceable in the changes of different variables. This emergent property of cohorts thus reduces the way in which social changes leads to predictable or linear outcomes in other domains of social life.

Thus new societal dimensions of aging (e.g. *the third age*) may change the way social relations of older populations interact with health factors and their subjective expressions about their social relations. In Neugartens account the young old distinctly move away from stereotypes of passive elderly people. She stated the cohorts that would constitute the young olds in 1990s would consist of individuals who had partaken actively in the societal upheavals of the 1960s thus they would more actively engage in politics (Neugarten 1974). In this material there exists an opportunity to observe changes in social relations among the young old and thus observe if the new cohort differ much in social relations.

However this self-fulfillment part of later-life could also be seen as a class based continuation of earlier life in-equalities combined with longer life-expectancies that makes way for new aging possible only for the upper classes. As Arber has observed there even seems to be an *accumulation* of advantage/disadvantage in late life as earlier life inequalities are extended into post-working life. These disadvantages are connected to marital status were divorced males are disadvantaged in all aspects, both social, health related and with material resources, widowed females are materially disadvantaged however they are not different from married women when it comes to most aspects of social relations. In contrast married women and men have better material resources, health behaviors and more expansive social

networks. Thus there seems to be an powerful interaction between marital status and gender in aging (Arber 2005).

However, Gilleard and Higgs note that class is an insufficient framework for the explanation of changes in ageing as the class based inequalities that follow into old age has changed radically from the early 20th century to the 21st century. The rise of different pension schemes has transformed it so that old age is not the main location of poverty in the life-cycle anymore compared to what it was in the early 20th century and the 19th century. Thus even though marked differences still exists the third age did not emerge as a class specific life-style before the 1980, instead the third age seems to have been an emergent stage of the life-course that is still influenced by class and other societal divisions. However it is not the transition of class based life-styles that determines a transition into the third age according to Gilleard and Higgs. Instead they propose a theoretical framework that makes use of Mannheims conceptual definition of generation to understand changes in the situation for the elderly today (Gilleard and Higgs 2002).

*Cohort and generation as a concept of study*

*"To assert that the cause of social change is demographic replacement would be tantamount to explaining a variable by a constant, yet each fresh cohort is a possible intermediary in the transformation process, a vehicle for introducing new postures." (Ryder 1965)*

In his seminal essay *"On the problem of generations"* Mannheim (1952/1928) elaborates on the concept of generation, seeing it as a group of individuals who are *"endowed with a common location in the historical dimension of the social process"*. This common location limits their potential experiences of the world and forms them as their *"early impressions tend coalesce in to a natural view of the world. All later experiences then tend to receive meaning from this original set."* This is not a deterministic view of the fate of members of any given generation it should instead be seen as a *"tendency inherent in every social location pointing toward certain definite modes of behavior, feeling and thought".* Thus the generation in itself becomes a potential *"formative factor in history"* (ibid., 291-298).

Mannheims definition of generation comes suspiciously close to cohort as his generational framework for it includes both a shared historical and temporal location, what Mannheim describes as *generation location*, however there is further also the distinction of generation consciousness in which the generation becomes aware that it constitutes a specific social group involved and that there is a bond between the members of the generation this constitutes a *generation as actuality*. Mannheim then argues that this distinction means that each generation "*need not evolve its own, distinctive pattern of interpreting and influencing the world; the rhythm of successive generation locations, which is largely based upon biological factors, need not necessarily involve a parallel rhythm of successive motivation patterns and formative principles*". These new and distinctive patterns of interpreting the world need a "trigger action" in the social or cultural process of change in society (ibid., 310).

The succession of cohorts is not, as stated by Ryder and Mannheim, the sole explanatory variable of social change but each new cohort carry the potential of being "*a vehicle for introducing new postures"(Ryder 1965)*. Since time of course is chronological these new postures are modeled on what came before but with new environmental conditions (i.e. longer and healthier life, new definitions of free time) the reinterpretation of old roles may come to change. This process of change is of course a complex amalgam of a multitude of interdependent factors however with the aid of comparative analysis one can gain a larger understanding of what change has occurred and what prior results must be reevaluated in the presence of social change.

*Changes in social relations in the 20th century, in- and outside the family*

How does this then coincide with change in social relations? Bengtson et al. has in recent work on family relations drawn from the work of noted scholar E. W. Burgess who hypothesized that the family was changing the 20th century from an institution founded in law and custom to one with more emphasis on love and companionship. Bengtson does not dispute this transformation rather he tries to emphasize that the demographical shift toward much longer life-expectancies have created family relations that span across many generations, the family has gone from pyramid to "beanpole". Thus grand-parents can have a much more active role in the lives of their grandchildren. However the beanpole family

structure is only one form of family structure that is becoming apparent within this demographic shift with delayed child bearing that creates large gaps in kinship succession, which may create new issues as individuals may experience a conflicting of interests as childrearing and care giving demands of elderly parents coincide (Bengtson 2001).

However the dystopian view that new family forms in industrial societies leading to the neglect of the elderly within families seems to be mostly a myth, at least in the U.S. (Bengtson 1993; Shanas 1979). This situation may of course be changing. However this change is only in the family dimension of social relations, in other dimension change has also occurred. It is often assumed that social relations are changing in the western world, that kin-networks are losing in importance and that friend-networks are gaining importance in the western world. Hollinger and Haller have shown that this assumption holds true for northwestern Europe and the New World countries that originate from these countries. However social support from kin seems to remain stable even in countries with less traditional family structure and with more spatial distance. With a notable exception of Italy it also seems that the importance of friends in social network is inversely correlated with the extended kin network. Thus it is perhaps more correct to speak of a downturn of the importance of the extended kin network in advanced industrial societies, however this downturn seems to show large socio-cultural variation (Hollinger and Haller 1990). In the SHARE-study Kohli et al could show that the Scandinavian countries had the least of what could be called a traditional family structure with higher divorce rates than both middle European countries and the southern European countries. This is reflected in for example frequency of contact with children and proximity to nearest living child. However Kohli et al states that even though the family structure has changed it seems that the family bond remains strong corroborating the results from abovementioned authors (Kohli, Künemund, and Lüdicke 2005). Interestingly the same SHARE-study found that Nordic countries had a lower reports of loneliness than the southern European countries (Sundström, Fransson, Malmberg, and Davey 2009). Loneliness has also been reported not to have increased over time (Tijhuis and Jong-Gierveld 1999; Victor, Scambler, Shah, Cook, Harris, Rink, and De Wilde 2002).

Earlier Swedish studies have shown interesting developments of social relations in Sweden. Statistics Sweden (SCB) have collected a major database ULF (The Survey of Living Conditions) which has resulted in several studies, one being the *Living Conditions of the Elderly* [Äldres levnadsförhållanden] (Vogel and Häll 2006). Two of the chapters in this study focus on the social relations of the elderly in Sweden; one on the longitudinal aspects (Häll 2006) and the other on issues concerning isolation (Nordenmark 2006). The results show that the social relations of the Swedish population have changed in several nonparallel lines over the time of this study (1980-2003). Swedes tend to have more close friends at same time as social relations with neighbors and close relatives have decreased. However there exists notable differences regarding the elderly, there are for example more elderly living with family now than 25 years ago, this can be explained by the increased longevity of the later born cohorts that leads to less widowhood. Based on the research finding there also seems to be large fluctuations of neighbor relations over the life-course with peaks after the retirement age and between 30-40 years of age. The main cohort difference regarding neighbor relations seems to be in the younger parts of life-course were they have dramatically decreased this is not seen in the later parts of the life-course. The number of individuals without a close friend has also decreased all across the life-course, but there is also significant life-course variability with younger individuals more often reporting that they have a close friend than older individuals (Häll 2006). The report also showed interesting findings regarding statements of loneliness. There were notable differences regarding age with older individuals reporting more feelings of loneliness and also some differences regarding the correlation with types of social relations and experience of loneliness. For instance it seems that among the 74+ social relations with family was of increased importance than for those below 74 years of age (Nordenmark 2006). A decline in church attendance of the elderly in Sweden has also been observed (Vogel 2002).

The questions of loneliness and social network have also been studied in the H70-studies in Gothenburg which are the studies that are being analyzed in this study. The first cohort born in 1901-2 and sampled in 1971-2 was analyzed regarding loneliness and its effect on other variables. They found that the lonely consumed more out-patient care, had a negative self assessment of health and also other negative factors. Loneliness was related to the loss of spouse and lack of friends (Berg, Mellstrom, Persson, and Svanborg 1981). A cross-cultural

analysis of the H70-study combined with a longitudinal study in Missouri revealed that social networks were predictors of longevity but that different factors of the social networks were of importance in different cultural settings (Eriksson, Hessler, Sundh, and Steen 1999). Another study of this cohort and the subsequent follow-up examinations showed increasing dispersion of social participation with increasing age, thus reporting a result that goes against the ageist stereotype of a homogenous group of old people (Eriksson 2008).

There are of course also social relations that are tied up in associations and other forms organizational life. As was mentioned earlier these types of social relations were greatly debated in the nineteen nineties and were proposed to be vital in building functioning democratic institutions (Putnam 1995). In another report from SCB named *Organizational life in Sweden* [Föreningslivet i Sverige] the membership and activity of organizations in Sweden were analyzed. These data showed similar findings as the above mentioned report on living conditions of the elderly showed, specifically that organizational life changed mostly in younger age groups. The young reported a drop in organizational membership as well as activity in organizational life between the 1992 and 2000, this trend was not reflected in the elderly population were instead organizational life on the whole remained constant (Vogel, Amnå, Munch, and Häll 2003).

In the U.S. Riley observes that there are substantial cohort differences in kin relations across the life-course, the increase in longevity has made the number of complex living arrangements and family structures larger, these relationships have also become more and more flexible. The relations have also become less dependent on societal obligations and more on individual choice, the relations are also not as restricted by age bound roles and help and support may come from individuals different ages and generations. These support structures are also in many ways latent and remain so until utilized. This new kind of safety net is in Rileys writings a *latent matrix* of kin connections which makes it different from an family structure based more firmly on the nuclear family. One of the driving forces behind this change toward the *latent matrix* is the increase in divorce which through step parenting, other forms of shared parenting and the proliferation of the number of grandparent has led to new forms of family life. Riley also notes that fathers kinship connections tend to weaken after divorce but female bonds tend to strengthen which Riley states would lead to the

troubling effect of older men with weak support structures. In these new family forms social support is also substituted, if filial support is not available then this is substituted with other means of support. However throughout these new forms of family relations, as has been referenced to in empirical research above, the traditional family kinship solidarity has not decreased. However with increasing longevity new cohorts will face longer relationships that previous less long-lived cohorts did not face (Riley and Riley Jr 1993).

*Typologies of social relations*

How should one then go about analyzing social relations? One could make the point that it is not fully satisfactory to look at social change in a statistical material on social relations by just observing the changes in separate variables. As these variables are interconnected one can assume that behavioral typologies can be traced by analyzing the different patterns of response. This leads to the conclusion that social relations come in bundles that are flexible but only to a certain degree, thus if one belongs to one typology of social relations then one can differ in degree of, say, frequency of contact with children to some extent in comparison to other individuals who are classified as having the same type of social relations. But the functional properties inherent in this typology remain the same and so does in extension its correlation with external covariates (such as social class or various health related variables). This is of course a generalization which bundles social relations and limits the variability into a set number of typologies. The typologies can be specified in several ways, they could for example be formed relying on qualitative interviews from which the typologies could be analytically induced. They could also be deduced statistically through various statistical methods such as *latent class analysis* or *k-means clustering*.

The positive attributes to such an analytic technique are obvious, by tying the variables to latent structures the variables can be analyzed in their interconnectedness. In this way the analysis can come closer to analyzing the emergent functional properties of the interconnectedness of the variables being analyzed, coming closer to the effect that they have in reality. Regarding social relations different social network types may have different functional capabilities regarding health and other indicators of well-being and may also vary across substrata of the population (e.g. social class, sex or others).

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Clare Wenger should be noted here as she has done pioneering work in the field of network typologies of the aged in Great Britain. She has constructed typologies of social support network type in to five types, ranging from the family dependent to the private and restricted (Wenger 1989). Using her typologies research has been done to analyze differences regarding urban and rural settings (Wenger, Davies, Shahtahmasebi, and Scott 1995), but to our knowledge little has been done in analyzing change over time in network typologies neither in size nor in composition (studies have been done on intra-individual change over time albeit that is not the same (Wenger 1990). Other network typologies of older adults have also been derived from empirical studies (see for example (Cheng, Lee, Chan, Leung, and Lee 2009; Fiori, Smith, and Antonucci 2007; Litwin 1997), these studies show some variation but mainly consists of four network types: the *diverse* networks which showed a lot of social activity which included both family, friends, neighbors and also activity in various organizational groupings; the *family focused* network which had many family contacts but not many friendship connections and low organizational activity; *friend focused* network with many friends but low organizational activity and not many ties with family and other kin; and finally the *restricted* network with few social connection overall. Large cultural variation has been shown in social network typologies (Cheng et al. 2009; Fiori, Antonucci, and Akiyama 2008).

One of the main interests in social network or social relation analyses have been its connection to health. As was mentioned briefly in the introduction several interesting results have been shown in this area. These results have later been replicated in many studies. However the causal factors and pathways that can explain these effects have not yet been illuminated (for an interesting article on the possible causality of social networks and health see Berkman et al., 2000).

Social network analysis and social support analysis can also be analyzed in a different way through a sociocentric approach in comparison to the egocentric approach that is common in survey research and that form the basis for the analyses cited above. The egocentric approach here stands for the analysis of social networks as properties that individuals have, i.e. person X has this and that many friends, that many relatives and he meets these with this

frequency. The sociocentric approach on the other hand tries to maps the ties between individuals and are thus able to observe for example which persons are in the center and which persons are in the periphery of social networks. In the sociocentric approach the network itself is therefore an object study; for example the sociologist Christakis shown the contagiousness of obesity in a methodologically fascinating way (Christakis and Fowler 2007). In the present study an egocentric analysis will be presented, due to data restrictions it is not possible to analyze intraindividual ties, however it was thought that this do not hinder the studies main goal which is that of cohort comparison. A sociocentric analytical approach would of course be interesting, but alas it is not possible.

*Implications for the study at hand*

The preceding discussion hopefully gave a readable and informative overview of the field of social relations and social change among an aging population. In this final part of the *Theory and earlier research* section these somewhat discordant parts will hopefully be summarized into a section that will clarify their relevance to the study at hand.

First, previous studies have reported changes in both family relations and other social relations; there are also theoretical calls for seeing the young old as new part of the life-course. If a new part of the life-course is being chiseled out then one could assume also that this new part of the life-course carried with it, to use Ryder's terms, new social *postures*. This is process of societal change is worthy of empirical investigation but the methodology of study is not self-evident. One could of course analyze how individual variables change over time; however this method only haphazardly describes the trends of individual *gestures* of social relations, to study the *posture* one must study interrelatedness of social relations. Only in such a way can it become clear if a new mode behavior is underway or if just some modes of behavior are becoming more frequent without realizing this transition's interrelatedness with other change. Thus, the theoretical discussion of generational changes coupled with the analytical framework of social relation typologies are well suited for an attempt at understanding whether one can really analyze if the changes have created new *modes* of behavior in any way.

Second, what kind of changes could be hypothesized to occur during this time period? How could they vary with different covariates in compositional or effectual change? Education and class are of course possible determinants of social relations in that different economic and educational resources may foster different patterns of social relations, however our material does sadly not allow for social class analysis. Relationship status however is of course a covariate that will most likely influence social relations in a most direct way. Here one can make the obvious critique of the inclusion of relationship status as covariate to predict social relations: it is a social relation! Though it is of course true that there is a difference in social relations if one is single or in a relationship, the same is not true of the difference between widowhood and being divorced. This is a difference in relationship status but not social relations, even though it may of course influence social relations differently. In light of these arguments relationship status was included as a covariate instead of as an item to analytically deduct different typologies of social relations from. One could of course hypothesize that since people divorce more often there would be more people that are not in a relationship, however as has been shown previously this might not be the case as people also remarry and the risk of widowhood has gone down in this age group as longevity has increased. However the rather obvious hypothesis is that relationship status has a large effect on both frequency and contentment of social relations. Another factor that has been clear from the outset is health. As has been pointed out many times previously in this section this is one of the things that have changed dramatically over the last century and especially for the old as longevity has increased. With the new cohorts being both healthier and more affluent one might also wonder if the relations with grandchildren have increased. As the nuclear family has become less of a given state of affairs then new social relations have become more important. Although Riley's latent matrix of social support network is perhaps vague one could perhaps see an increase in social relations with grandchildren and friends in our material. However, this might be a too easy hypothesis when also taken into account the cohort differences presented in the first sections of this text. As one can tell from the fertility graph (graph 1) the Swedish population was in a fertility slump in the 1930s, exactly when many of the individuals in the first cohort became parents. From this information one could logically hypothesize that this first cohort would perhaps have fewer children and this childlessness might have large effects social relations. It is however unclear how this might

influence social relations, it could perhaps lead to more connections with friends or extended family. That church attendance has gone down is a rather obvious hypothesis.

Third, the demographic influence just mentioned lies at the heart of what this cohort comparison wishes to analyze. The hypothesis here is that there should be notable generational differences in primarily the spectrum of contentment as new values of what is to be expected of the young old influence their evaluation of their own social relations. A more active social life is of course also to be expected of the young old however this may perhaps not be visible as an increase of all social relations but as a recombination of social relations that would feature more social relations outside of the family however this might be muddled by the demographic factors just mentioned. Also one could hypothesize that different covariates will have different effect on social relations thus restructuring the combination of outcomes. If the different covariates have large effects on social relations this might also be an indication of their importance in forming social relations in this age group.

# Method

The method section will explain the data being analyzed; the methodological differences that exist between the two samples, what kind of transformations were done to prepare the data for analysis and the kind of statistical analysis used.

*Data*

The multidisciplinary H70-studies were started in the beginning of the 1970s and were aimed at studying the health and health related factors of an elderly population in Gothenburg, Sweden. The samples were systematically drawn from the Swedish population registry. Both individuals living in private households and institutions were included. The participant underwent a comprehensive somatic examination and subsamples took part in among other psychiatric, dental and nutritional examinations.

In 1971-2 the first H70 survey was designed with the objectives: *"1) to make a survey of the social and medical conditions of the population. 2) To obtain basic data for planning the care of the elderly. 3) To contribute to the knowledge of normal ageing processes and of normal criteria within the age group. 4) To offer subjects a through medical examination".* A representative sample of 70-year olds was drawn from the population in Gothenburg in 1971-2 consisting of individuals born between July 1$^{st}$ 1901 and June 30$^{th}$ 1902 with dates ending in 2, 5 or 8. The examination consisted of a house call part which consisted of interviews in the respondent's home, where questions regarding for example social relations were asked. A medical examination on a hospital site was also conducted as a second step. The overall response rate was 84.8 % (n=973) for the complete examination and 87.8 % (n=1007) participated in the house call part of the study. There seemed to be no significant differences between responders and non-responders, regarding gender or marital status however differences were found between both male responders whom had higher rates of incomes and female responders whom had higher prevalence of somatic in-patient care than their non-responding counterparts. The study has been described in greater detail elsewhere (Rinder, Roupe, Steen, and Svanborg 1975).

The second sample consisted of those born in 1930 on days 3, 6, 12, 18, 21, 24 or 30 each month, this sample also consisted of a new H70-cohort merged with the members of the Prospective Population Study of Women (PASW) living in Gothenburg to create a new 70-year old cohort based a on representative sampling frame. These were invited to a health examination in 2000-1 (N=767). It should be noted that the combined sample in 2000 showed some participation bias, there were for example more women who participated and the participants also showed lower three-year-mortality and lower prevalence of recorded psychiatric illness in Swedish Hospital Discharge register and also that they were less often never married. Of these 486 completed a questionnaire regarding social networks and relations (response rate 63 %) before partaking in a full examination. The sample has been described in greater detail elsewhere (Beckman, Waern, Gustafson, and Skoog 2008; Karlsson, Klenfeldt, Sigström, Waern, Östling, Gustafson, and Skoog 2009)[1].

*Difficulties comparing the two cohorts and in measuring social relations*

There are of course obstacles to cohort comparisons, primary in availability of data that can be used for comparative purposes. The choices of indicators included in the spectrums were the following. For the spectrum of frequency it is frequency of visit to and from children, visits to and from neighbors, greeting neighbors, frequency of visit to and from acquaintances other than children and neighbors, frequency of church attendance, membership in an organization and frequency of participation in organization. The spectrum of contentment included contentment with level of contact with children, neighbors and acquaintances other than children and neighbors, feelings of loneliness and change in loneliness over the last ten years.

One could of course criticize the inclusion of organizational and church attendance into the spectrum of frequency as not necessarily including intra-personal relations although this of course true it also true that in these setting a lot of intra-personal relations take place and

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[1] It should be noted that these background analyses and participations biases were analyzed on the same sample but with slightly different subsamples, no independent participation bias analysis was conducted for this specific analysis.

their exclusion would probably leave out a lot information on social relations. One could also criticize the inclusion of the change in loneliness variable, however it was deemed interesting to observe a subjective feeling of loneliness change as the respondent entered post-working life.

The empirical data, as stated above, of this study consist of two samples one examined in 1971-2 consisting of 1007 individuals and one in 2000-1 consisting of 486 individuals, all individuals were aged 70 as they were examined. The data used in this study is thus well suited for this kind of analysis however it has a number of limitations as well; two points are of special concern.

First, since the main point of this epidemiological study was not social relations or networks the variable items that are included are perhaps not ideally constructed for measuring social networks and more information would perhaps be necessary to get a more in depth analysis of social relation of seventy-years-olds. For example, there are no questions on contact with grandchildren or other relatives than children in the questionnaire from the 1971-2, there are such questions in the questionnaire from 2000, but since they are not in both the questionnaires comparisons cannot be made. There are also no questions on telephone contact in the earlier questionnaire or other forms of contact than in person contact. Finally the word friend is not used to differentiate a special type of social relations instead the broader category of *"acquaintance other than children or neighbor".* These are of course major detriments for the study, but there are no way to get around the incomplete questionnaire of the early 1970s if one wants to make comparative studies, the questions compared have to be the same for valid comparisons to be made.

Second, differences in methodology due to financial constraints and organizational changes the methodology of the survey was changed. In 1971-2 social networks were investigated using interviews in the respondent's home, in 2000-1 the survey was conducted in the clinic and the social network part of the survey was distributed as a questionnaire to the participants that they filled out for themselves either at the clinic or in their home. This is of course another possible source of bias particularly so called social desirability bias. In a study comparing different methods of data collection the sensitive issue of abortion differed as

more were in favor of abortion in mailed questionnaires than in interviews, the more sensitive issue was easier approve of in the mailed questionnaire (Wiseman 1972). How does this then impact our study? Are there questions that are so sensitive that they would give rise to different answers from different data collection techniques? In *spectrum of frequency* it should be of little concern as these questions are not of the sensitive sort. The questions of more concern are instead those in the *spectrum of contentment* were one should be aware that questions regarding loneliness could be influenced by the social desirability of responding to the interviewer that one is not lonely instead of displaying weakness and admitting loneliness. This bias seems to have a gender component with men underreporting loneliness (Borys and Perlman 1985), if there exists a comparable bias regarding methodological differences and loneliness is not clear. However the underreporting bias that the sensitive issue of loneliness raises has led some researchers on loneliness to leave out the specific word "loneliness" when constructing measures of loneliness (Gierveld 1998). However since the objective of our study was not measuring loneliness the use of the word loneliness should perhaps not be overstated but recognized as a potential source of bias.

One could make the case that these weaknesses prohibit inference from being drawn regarding cohort differences. Nevertheless, in this study the case is made that these difficulties are surmountable in the sense that they postulate that inference from this statistical material should be drawn with caution based on knowledge regarding these difficulties.

*Transformation of data*

As mentioned in the earlier the many questions on social relations was divided into two parts one which was named *spectrum of contentment* with social relations and one *spectrum of frequency* of social relations. Some of the questions in the material had changed response alternatives regarding for example frequency of visits in such cases the response alternatives were combined to create congruent measures. In the case of organizational membership the first cohort were asked two questions one asking for membership in the Pensioners association *(Pensionärsföreningen)* and one asking for membership in any organization. In the second cohort these questions were asked as being member of *any* pensioner's organization and any

other organizations. To attain comparability these questions were combined to create a question that gave information on all kind of organizational activity (the same thing were done for the questions on organizational activity).

*Statistical methods*

Chi-square tests were used for analyzing differences between the two samples regarding individual questions or characteristics.

Latent class analysis (LCA) was used to create empirically deduced typologies of the social relations. LCA is a powerful tool to analyze response patterns. It analyzes the data's response patterns and analyzes if the data can be sorted into underlying unobserved latent classes. These latent classes then correspond to subtypes of the population and thus their response patterns (Collins and Lanza 2009). It allows for categorical variables which other techniques such as factor analysis, which also use latent variables do not do. Compared to other clustering techniques such as k-means clustering LCA is a very powerful and reliable method (Magidson and Vermunt 2002). In this study *PROC LCA 1.2.4 beta* was used which is an add on for SAS that has been developed by the Methodology Center at Pennsylvania State University (Lanza, Collins, Lemmon, and Schafer 2007).

The latent class analyses in our study were conducted with two main hypotheses in mind. Did the samples differ and in what way did they differ? They were carried out in the following fashion, first the samples latent structures were evaluated for each group separately, then a combined model was conducted to analyze whether the groups differed either fully, that is if the item response probabilities and latent class probabilities of the different latent classes were different or if the assumption held that only the latent class membership probabilities varied across groups. Analyses were also carried out to observe if individual latent class prevalence's differed across cohorts.

Identification problems and local maxima[2] of the likelihood function can be a problem in LC. Each model was tested with a hundred different start numbers or seeds to analyze if a maximum likelihood solution had been reached for the LCA models.

When working with covariates and LCA several strategies can be employed, two of these strategies will be discussed briefly here. A straightforward approach is to classify individuals based on the class that they are most likely to be a part of using each individual's posterior probability (a probability generated for each individual of belonging to each latent class) and then analyzing using this variable of fixed latent class membership. This strategy has obvious drawbacks as it treats the latent class as manifest variable and thus ignores classification error which might lead to biased results. Another technique that is frequently used is to include the covariates in the latent class models and thus estimating them together. This strategy has the benefit of each individual having a probability of being in several latent classes thus this technique can incorporate classification error when allowing each individual to be a fractional member of each latent class. However this approach can influence the interpretation and be computationally cumbersome. In an interesting study Clark and Muthén showed that even though the inclusion of covariates into the latent class model was preferable using the most likely latent class membership approach was adequate for a model were classification certainty was at an acceptable level (this was set at entropy[3] measurements exceeding 0.80). One should however perhaps be more conservative with p-values as the standard errors might be underestimated with this method (Clark and Muthén 2010).

In this study the strategy of classifying individuals into latent classes based on their most likely membership was used if the models allowed for it (i.e. they showed high entropy measurements). Additionally some of the covariates had extra missing data which the latent class program does not allow for on covariates. One could perhaps have removed all variables with missingness on any covariate but this would have lead to the inevitable probability of bias in the latent class estimation process. Thus the latent class analysis was

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[2] Identification problems meaning that the maximum likelihood model has local solution which is not the maximum likelihood solution or that the solution is not identifiable.

[3] Entropy is a measurement of classification error.

done with all possible data. Model building with covariates were done using binary or multinomial logistic regression. When conducting the multivariate analyses only those with complete responses on all covariates were included in the analyses. In the case of two latent classes predicting latent class membership was done using binary logistic regression techniques when the latent classes' exceeded two, multinomial logistic regression was used. Logistic regression is a regression technique that allows for a binary dependent variable, multinomial logistic regression allow for a nominal dependent variable. To safeguard against overfitting in the multivariate models variables were removed from the multivariate models if they were not deemed statistically significant in at least one cohort.

# Results

In this section the results from the material will be presented straightforward and without theoretical analysis, this is left for the discussion. Table 1-3 show the response percentages for the questionnaire items on social relations. Table 1 shows background information divided by cohort, table 2 and 3 show response percentages divided by cohort and also into the before mentioned *spectrum of frequency* and *contentment*. The cohort born in 1930 reported a higher number of parents and grandparents, lower 5-year mortality and also a higher degree of individuals reported being in a relationship (table 1).

Trends can be shown in higher reported frequencies of neighbor interactions. A lower religious service attendance can also be shown and a more frequent visits from or to acquaintances. Higher frequencies of membership in organizations and frequency of attendance at organizational meetings can also be shown. When observing the change in contact with children one must note that the difference in this variable is perhaps mostly due to the fact of difference in parenthood, when observing only parents (not shown) there seems to have been a slight drop in parents meeting their children once week or more however this change is not significant. Those reporting feelings of loneliness sometimes or seldom seems also to have risen in the later cohorts and also those reporting feeling lonelier now than ten years ago (table 3).

The latent class analyses of the two spectrums of social relations were carried out in a stepwise approach (see method section for details). For the *spectrum of frequency* a three class model was decided to fit the material best. As seen in table 4 in the appendix one could have opted for a 2 class solution as this was deemed most appropriate by the BIC[4] measurement for model selection in the 2000 sample, however since AIC measurements pointed in the other direction and it is also much easier to conduct a multigroup analysis with equal

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[4] BIC and AIC are information criteria that are designed to compare the maximum log-likelihood values of statistical models but in different ways penalize models for the number of parameters used to reward parsimony. In simulation studies BIC has been shown to be good indicator of the ideal number of latent classes LCA (Nylund et al. 2007).

amounts of groups this was deemed most appropriate. It should also be noted that the two class solution was without a class that had a somewhat restricted social network which was deemed theoretically problematic.

Some notes should be made of the identification of a solution for the chosen model. The model was tried with a hundred random starts and circa 35 % were associated with the best fitted model. This may seem unsatisfactory but this solution proved to be the same solution for the two samples as when estimating them separately which higher identification rates (circa 50 % in the 1971-2 sample with three latent classes and circa 50 % in the 2000 sample with three latent classes). In light of these findings it was concluded that even though there were some identification problems this was an appropriate solution from which to proceed with the analysis. This was a judgment call and other researchers might have made another decision and opted for a simpler model.

| Table 1. Background information (%(n)) | | | | |
|---|---|---|---|---|
| | | 1971-72 (n=1007) | 2000 (n=486) | p-value |
| Gender | | | | |
| | Male | 46.38 (467)[5] | 46.71 (227) | 0.9119 |
| | Female | 53.62 (540) | 53.29 (259) | |
| Relationship status | | | | |
| | Married/in a relationship | 59.38 (576) | 68.48 (315) | <.001 |
| | Not in relationship | 18.66 (181) | 16.09 (74) | |
| | Widowhood | 21.96 (213) | 15.43 (71) | |
| Do you have children? | | | | |
| | Yes | 71.31 (711) | 87.08 (411) | <.0001 |
| | No | 28.69 (286) | 12.92 (61) | |
| Do you have grandchildren? | | | | |
| | Yes | 65.69 (653) | 79.35 (369) | <.0001 |
| | No | 34.31 (341) | 20.65 (96) | |
| Education | | | | |
| | None-Primary school | 84.16 (829) | 59.66 (284) | <.0001 |
| | Secondary school/ Unfinished upper secondary school | 12.08 (119) | 25.42 (121) | |
| | Graduation from upper secondary school /University | 3.76 (37) | 14.92 (71) | |
| Five-year mortality | | | | |
| | Deceased five years after examination | 15.29 (853) | 4.16 (20) | <.0001 |
| | Alive five years after examination | 84.71 (154) | 95.84 (461) | |

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[5] That some variables frequencies do not add up to the same number as the total sample size is because of internal missingness.

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| Table 2. Spectrum of frequency of social relationships (%(n)) | | 1971-72 (n=1007) | 2000 (n=486) | p-value |
|---|---|---|---|---|
| Visits from children or visits to them. | | | | |
| | >1 visit /week | 44.36 (433) | 49.15 (231) | <.0001 |
| | <1 visit/week | 25.61 (250) | 37.02 (174) | |
| | Never | 0.72 (7) | 0.85 (4) | |
| | Do not have children | 29.30 (286) | 12.98 (61) | |
| Do you and your neighbors visit each other to say hello? | | | | <.0001 |
| | Yes, often/ Yes, sometimes | 31.24 (308) | 59.31 (277) | |
| | No, never | 68.76 (678) | 40.69 (190) | |
| Do you stop and talk with your neighbors when you meet? | | | | <.0001 |
| | Yes, often / Yes, sometimes | 87.84 (867) | 95.74 (450) | |
| | No, never | 12.16 (120) | 4.26 (20) | |
| How often do you receive visits or visit other people than children or neighbors? | | | | <.0001 |
| | >1 visit /week | 19.98 (185) | 27.18 (128) | |
| | <1 visit/week | 75.92 (703) | 69.43 (327) | |
| | Never | 4.10 (38) | 3.40 (16) | |
| How often do you attend a religious service? | | | | <.0001 |
| | At least once a month | 24.47 (233) | 12.98 (61) | |
| | Less than once a month | 31.30 (298) | 37.87 (178) | |
| | Never | 44.22 (421) | 49.15 (231) | |
| Are you a member of an organization? | | | | <.0001 |
| | Yes | 52.02 (514) | 71.88 (340) | |
| | No | 47.98 (474) | 28.12 (133) | |
| How often do you visit organizational meetings? | | | | <.0001 |
| | At least every month | 31.52 (312) | 46.38 (218) | |
| | Less than once a month | 13.03 (129) | 19.36 (91) | |
| | Never | 55.45 (549) | 34.26 (161) | |
| | | | | |

| Table 3. Spectrum of contentment (%(n)) | | | | |
|---|---|---|---|---|
| | | 1971-72 (n=1007) | 2000 (n=486) | p-value |
| Do you think that you have enough, too much or too little contact with your children? | | | | <.0001 |
| | Too much | 0.31 (3) | 0.64 (3) | |
| | Enough | 59.45 (579) | 72.65 (340) | |
| | Too little | 10.88 (106) | 13.68 (64) | |
| | Do not have children | 29.36 (286) | 13.03 (61) | |
| Do you think that you have enough, too much or too little contact with your neighbors? | | | | 0.8473 |
| | Too much | 0.11 (1) | 0 (0) | |
| | Enough | 90.31 (857) | 91.06 (428) | |
| | Too little | 9.59 (91) | 8.94 (42) | |
| Do you think that you have enough, too much or too little contact with other people than children or neighbors? | | | | 0.0873 |
| | Too much | 0.95 (9) | 0 (0) | |
| | Enough | 85.91 (817) | 86.23 (407) | |
| | Too little | 13.14 (125) | 13.77 (65) | |
| Do you feel lonely? | | | | <.0001 |
| | Never | 70.17 (694) | 46.51 (220) | |
| | Seldom / Sometimes | 23.36 (231) | 50.74 (240) | |
| | Often | 6.47 (64) | 2.75 (13) | |
| Do you feel more or less lonely now than ten years ago? | | | | <.0001 |
| | Yes, more | 19.88 (196) | 27.12 (128) | |
| | No difference | 79.82 (787) | 68.22 (322) | |
| | No, less | 0.30 (3) | 4.66 (22) | |

The multi-group test suggested that measurement invariance did not hold, thus the latent classes were structured different in the two different cohorts. Tests of latent class prevalence constraints (see table 5 and 6 in the appendix) show that latent classes are in all cases different in proportion, however one can of course object to this test on the grounds that the classes were different in item response probabilities from the start. Even though they were different similarities were apparent in the latent classes across cohorts and a test to analyze if they were different in size and not just in composition was decided to be of interest.

The latent class structures in the two samples show striking similarities, even though measurement invariance does not hold (see table 8, each cell is a probability that ranges from 0-1). There are two large groups and one smaller. The first latent class was a group who had frequent social relations and was not involved in organizational life. The second latent class was in many ways similar to the first group but was involved in organizational life. Also the two first classes were different in 2000 as more individuals answered that they visited their neighbors and a lower religious service attendance as well as more frequent visits from or to acquaintances. The second latent class had also grown much bigger in the cohort born in 1930. The third latent class had a much more restricted social life, and less frequent social contact parts of the spectrum with the exception of religious service attendance and organizational involvement compared to the non-organizational first latent class. There also seemed to be some differences between the groups in the two samples in those born 1901-2 there were higher frequency of visits with acquaintances and religious service attendance but fewer neighbor interactions and organizational activity. The restricted group was also significantly smaller in those born 1930.

The covariate model for the spectrum of frequency was done by first classifying each individual as belonging to a certain class. The entropy statistic was high (0.94) and the following classification was very close to the proportions computed in the latent class model (see table 7 in the appendix).

| Table 8. Spectrum of frequency latent class model[6] (n=1470) | | 1971-2 | | | | 2000-1 | | |
|---|---|---|---|---|---|---|---|---|
| | | Class 1 | Class 2 | Class 3 | | Class 1 | Class 2 | Class 3 |
| Class probabilities | | 0.441520 | 0.459621 | 0.098859 | | 0.314844 | 0.639620 | 0.045537 |
| Variable | | | | | | | | |
| Visits from children or visits to them. | >=1 visit /week | 0.468160 | 0.450591 | 0.295111 | | 0.492559 | 0.508956 | 0.238532 |
| | <1 visit/ week | 0.224736 | 0.283178 | 0.270531 | | 0.347641 | 0.370356 | 0.522947 |
| | Never | 0.009336 | 0.002195 | 0.021436 | | 0.000000 | 0.006633 | 0.093268 |
| | Do not have children | 0.297767 | 0.264036 | 0.412921 | | 0.159800 | 0.114055 | 0.145253 |
| Do you and your neighbors visit each other to say hello? | Yes, often/ Yes, sometimes | 0.342313 | 0.350308 | 0.000000 | | 0.657320 | 0.604373 | 0.000000 |
| | No, never | 0.657687 | 0.649692 | 1.000000 | | 0.342680 | 0.395627 | 1.000000 |
| Do you stop and talk with your neighbors when you meet? | Yes, often / Yes, sometimes | 0.992648 | 0.957380 | 0.000000 | | 0.981581 | 0.979291 | 0.476918 |
| | No, never | 0.007352 | 0.042620 | 1.000000 | | 0.018419 | 0.020709 | 0.523082 |
| How often do you receive visits or visit other people than children or neighbors? | >=1 visit /week | 0.182182 | 0.225749 | 0.153139 | | 0.265449 | 0.294176 | 0.000000 |
| | <1 visit/ week | 0.775027 | 0.774251 | 0.591058 | | 0.727134 | 0.693478 | 0.481171 |
| | Never | 0.042790 | 0.000000 | 0.255803 | | 0.007417 | 0.012346 | 0.518829 |
| How often do you attend a religious service? | At least once a month | 0.178086 | 0.312167 | 0.229843 | | 0.073091 | 0.159196 | 0.108932 |
| | Less than once a month | 0.352426 | 0.285668 | 0.262142 | | 0.316510 | 0.436407 | 0.000000 |
| | Never | 0.469488 | 0.402164 | 0.508015 | | 0.610398 | 0.404398 | 0.891068 |
| Are you a member of an organization? | Yes | 0.097632 | 0.997416 | 0.177276 | | 0.238505 | 0.976108 | 0.425736 |
| | No | 0.902368 | 0.002584 | 0.822724 | | 0.761495 | 0.023892 | 0.574264 |
| How often do you visit meetings of organizations? | At least every month | 0.007864 | 0.666071 | 0.052402 | | 0.000000 | 0.699020 | 0.308949 |
| | Less than once a month | 0.004485 | 0.275825 | 0.014050 | | 0.000000 | 0.300980 | 0.000000 |
| | Never | 0.987651 | 0.058104 | 0.933548 | | 1.000000 | 0.000000 | 0.691051 |

[6] Each number represents a probability that ranges from 0-1. The group probabilities represent the probability of being a part of a certain latent class, for example 0.44 for being in latent class 1 in 1971-2. The item response probabilities represent the probability of responding in a certain way for each latent class, for example there is 0.098 probability being a member of an organization in latent class 1 in 1971-2. All probabilities sum up to 1 for each item in each latent class, group probabilities also sum up to 1 per group (i.e. cohort).

The covariate analyses of the spectrum of frequency model (see table 9 in the appendix for the univariate model and table 10 for the multivariate model) were done using the first latent class a reference class. In the multivariate model not being in a relationship, widowhood and being male was associated with having a restricted social network in the first cohort. Being male was also associated with being in the second latent class in the first cohort. In the second cohort not being in a relationship and death within 5-year of the study was associated with having a restricted social life. It should be noted that there were additional missing data when adding covariates to the model which might influence inference.

| Table 10. Odds ratios (95% CI) for **multivariate** models of *spectrum of frequency* **(n=1396).** | | | | | | |
|---|---|---|---|---|---|---|
| Variable | 1971 | | | 2000 | | |
| | Class 1(ref.) | Class 2 | Class 3 | Class 1(ref.) | Class 2 | Class 3 |
| *5-year survival* | | | | | | |
| Yes | Ref. | 1 | 1 | Ref. | 1 | 1 |
| No | | 0.739 (0.501, 1.090) | 1.517 (0.857, 2.683) | | 1.794 (0.490, 6.565) | 10.875 (1.975, 59.878) |
| *Gender* | | | | | | |
| Male | Ref. | 1 | 1 | | 1 | 1 |
| Female | | 0.508 (0.379, 0.679) | 0.543 (0.325, 0.906) | | 0.886 (0.571, 1.375) | 0.870 (0.286, 2.645) |
| *Relationship status* | | | | | | |
| In a relationship | Ref. | 1 | 1 | | 1 | 1 |
| Not in a relationship | | 1.105 (0.757, 1.614) | 4.245 (2.338, 7.707) | | 0.985 (0.540, 1.795) | 7.049 (2.279, 21.810) |
| Widowhood | | 1.380 (0.961, 1.981) | 4.407 (2.400, 8.092) | | 1.228 (0.653, 2.307) | 0.910 (0.096, 8.586) |
| *Grandchildren* | | | | | | |
| Yes | - | - | - | - | - | - |
| No | - | - | - | - | - | - |
| *Education* | - | | - | - | - | |
| None-Elementary school | - | - | - | - | - | - |
| Secondary school/ unfinished upper secondary school | - | - | - | - | - | - |
| Graduation from upper secondary school /University | - | - | - | - | - | - |

The latent class analysis of the *spectrum of contentment* showed that a two class model represented the data well (see table 11 for details on model selection). The test for measurement invariance across cohorts was rejected thus the latent classes were structured differently in the two cohorts. Measurement constraints also showed that the prevalence's of latent classes also were different (see table 12 and 13 in the appendix for details).

In table 15 the item response probabilities in the latent class model for the spectrum of contentment is shown. As with the model for the *spectrum of frequency* the latent classes from the two samples showed large similarities. The first latent class consisted of those who considered themselves content with the state of their social relations; this class was smaller in the first cohort than in the cohort born in 1930. There were also some notable differences among the cohorts regarding item response probabilities in the first latent class; in the 1930 cohort the latent class that mostly answered that they were content with their social life also answered more often stated that they experienced loneliness sometimes or seldom. The second latent class consisted of people who were discontented with their social relations; this group was larger in the 1930 cohort. There were also some differences in the dissatisfied groups composition, in the 1930 cohort the question of loneliness were more often answered with a *sometimes/seldom* than in the early cohort were this second class seems to consist of even more discontented individuals who more frequently expressed feeling lonely *often*.

The covariate model for the spectrum of contentment was done by first classifying each individual as belonging to a certain class[7]. The entropy statistic was high (0.84) and the following classification was very close to the proportions computed in the latent class model (see table 14 in the appendix). The covariate analysis of the spectrum of contentment (table

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[7] The modeling choice of including the covariates into the latent class models computation (explained in the method section) was also tried for both the *spectrum of contentment* and *spectrum of frequency*. The results of these analyses showed the same results with minor changes, however when introducing "stabilizers" to allow for computation of these models some characteristics of the latent class model also changed. The significance of these changes were hard to evaluate and since entropy measurements and therefore subsequent classification was so good the most likely classification strategy seemed a reasonable approach to avoid inconsistency in latent class classification.

15 in the appendix for the univariate analysis and table 16 for the multivariate analysis) showed that discontentment with ones social life was associated with 5-year survival, however it was only associated with 5-year survival in the later born cohort. It was also associated with not being in a relationship, widowhood and being female in both cohorts. It should be noted that there were additional missing data when adding covariates to the model which might influence inference.

| Table 15. Spectrum of contentment latent class model  (n=1468) | | 1971-2 | | 2000-3 | |
|---|---|---|---|---|---|
| | | Class 1 | Class 2 | Class 1 | Class 2 |
| Class probabilities | | 0.777727 | 0.222273 | 0.633881 | 0.366119 |
| Do you think that you have enough, too much or too little contact with your children? | Too much | 0.002649 | 0.004592 | 0.000000 | 0.017433 |
| | Enough | 0.627993 | 0.476955 | 0.786791 | 0.622816 |
| | Too little | 0.068835 | 0.248957 | 0.083348 | 0.228583 |
| | Do not have children | 0.300524 | 0.269496 | 0.129861 | 0.131168 |
| Do you think that you have enough, too much or too little contact with your neighbors? | Too much | 0.001347 | 0.000000 | 0.000000 | 0.000000 |
| | Enough | 0.955947 | 0.713101 | 0.985281 | 0.781122 |
| | Too little | 0.042706 | 0.286899 | 0.014719 | 0.218878 |
| Do you think that you have enough, too much or too little contact with other people than children or neighbors? | Too much | 0.010682 | 0.005132 | 0.000000 | 0.000000 |
| | Enough | 0.924482 | 0.626536 | 0.982612 | 0.652759 |
| | Too little | 0.064837 | 0.368332 | 0.017388 | 0.347241 |
| Do you feel lonely? | Never | 0.900976 | 0.000000 | 0.676942 | 0.098371 |
| | Seldom /Sometimes | 0.099024 | 0.707394 | 0.323058 | 0.826560 |
| | Often | 0.000000 | 0.292606 | 0.000000 | 0.075069 |
| Do you feel more or less lonely now than ten years ago? | Yes, more | 0.010650 | 0.855046 | 0.037711 | 0.675470 |
| | No difference | 0.987994 | 0.136028 | 0.908959 | 0.289555 |
| | No, less | 0.001356 | 0.008926 | 0.053329 | 0.034975 |

| Table 16. Odds ratios (95% CI) for multivariate models of *spectrum of contentment* (n=1396) | | | | |
|---|---|---|---|---|
| | 1971-2 | | 2000-3 | |
| Variables | Latent class 1 (ref.) | Latent class 2 | Latent class 1 (ref.) | Latent class 2 |
| *5-year survival* | | | | |
| Yes | | 1 | | 1 |
| No | | 1.475 (0.949, 2.291) | | 4.616 (1.678, 12.696) |
| *Gender* | | | | |
| Male | | 1 | | 1 |
| Female | | 1.600 (1.112, 2.304) | | 1.726 (1.083, 2.752) |
| *Relationship status* | | | | |
| In a relationship | Ref. | 1 | Ref. | 1 |
| Not in a relationship | | 1.661 (1.062, 2.599) | | 2.444 (1.399, 4.270) |
| Widowhood | | 4.920 (3.338, 7.251) | | 2.621 (1.439, 4.775) |
| *Grandchildren* | | | | |
| Yes | - | - | - | - |
| No | - | - | - | - |
| *Education* | - | | - | - |
| None-Elementary school | - | - | - | - |
| Secondary school/unfinished upper secondary school | - | - | - | - |
| Graduation from upper secondary school /University | - | - | - | - |

# Discussion

The discussion will be structured in to three parts; the first discussing the validity of the results; the second will be focused on the implications of these results and finally the third will focus on suggestions for future research.

*Interpretation of the results and their validity*

The first thing that should be said about the results from this study is that the changes are not as great as changes in for example sexual activities in this age group which are much more profound (see Beckman et al 2009). However there are changes and an attempt at theoretical explanation is made in the following sections. But when working with a material that has complications regarding methodological change and other sources of bias these problems must first be thoroughly discussed.

The higher degree of parents in the later-born sample is, as explained in the introduction, a consequence of the fluctuations of fertility in Sweden during the 20th century (some of the difference could of course be explained by participations bias but that this would account for the entire difference is highly unlikely). The changes in the *spectrum of frequency* which are mainly related to the higher participation in organizations seems to partly be explained by women participating more frequently in organizations (males membership also rose but not as much as females (not shown) and gender does not in the later cohort predict membership in the organizational latent class), it can therefore be seen as catch-up effect. One other thing is however troubling with the organizational membership frequencies, they seem too low, in a previously noted report organizational membership in this age group for 2000 was higher (~90%) (Vogel, Amnå, Munch, and Häll 2003). This discrepancy is vexing. Regional difference seems not to be the source, but one could possibly assume that with a more extensive questionnaire on these items the membership in organizations are not active in are not easily forgotten, as they could possibly be when just two questions are asked. The change in membership and activity was also hard to evaluate since no reference material was found. The higher degree of neighbor interaction is perhaps even harder to evaluate as this question

is idiomatically phrased and measures subjective frequency of neighborhood relations. Other studies have shown neighbor relations in this age-group being constant from the 1980s onward so this dramatic change seems peculiar and it is hard to evaluate if it means more frequent neighbor relations or if it reflects a reformulation of the idea of what neighborhood interaction means. Perhaps this interpretation is also supported by the fact that the other variable on neighbor relations shows less change. There are also changes in the *spectrum of frequency* that relates to what is not measured, for instance telephone, mail and e-mail contact is not measured and these most likely have changed. Critique of omissions are also valid for the *spectrum of contentment* as several unanswered questions regarding for instance close friends of course clouds our analysis and restricts the depth of our knowledge of the subject being studied.

The changes in the *spectrum of contentment* are tricky to evaluate since they are the most likely to be influenced by possible bias introduced by changes in methodology. As was mentioned earlier (Wiseman 1972) interviews are prone to reducing the admission of sensitive opinions. As has been shown earlier loneliness is a sensitive subject (Gierveld 1998) that could influence subjects into giving less straightforward answers, but one might add that answering that one *seldom* feels lonely is perhaps not the most sensitive admission. There is also another interesting change in this item. The number of individuals that have answered that they are often lonely have seemed to decrease, one might assume that this is the most sensitive category that would be most affected by the change in methodology; however this seems not to have been the case. One might also add that the other questions regarding contentment of social relations remain mostly unaffected during this period, which would strengthen the conclusion that the perceived *mild* loneliness has actually increased while actual isolation has decreased. Other studies have found no increase in loneliness across the life-course at least in Great Britain and the Netherlands (Tijhuis and Jong-Gierveld 1999; Victor et al. 2002), interestingly the British study has the same difference in methodology going from interviews to self-administered questionnaires (Victor et al. 2002). The responses might seem high compared to other measurements of loneliness in another study that measured loneliness in Sweden (Sundström, Fransson, Malmberg, and Davey 2009), however if one excludes the answer *seldom* which they do not have as a possible response in their question then the responses are roughly the same as in this study (although their survey has respondents aged

65< or older, the mean age of the sample was 74.2 which makes eyeball comparisons at least of interest).

Another source of bias that might be manifest in the material is the gender difference in discontentment; this might be due to the what has previously been described as underreporting of loneliness from males when asked the question directly (Borys and Perlman 1985). That males underreport loneliness is hard to evaluate however the different associations between frequency and contentment evident by the fact that there is reverse gender associations between the restricted group in the *spectrum of frequency* (albeit only in the first cohort) than the one in the *spectrum of contentment,* might point in that direction. Finally, the impossibility of including social class and subjective health into the regression models is a major concern and it is a major detriment to the validity of the multivariate models.

Overall one cannot say for certain what the implications of this series of potential biases have had for the interpretation of the results and the statistical analyses. The most severe possible source of bias is the change in methodology from interviews to a self-administered questionnaire, however as was pointed out above there seems reasonable that this influence was not considerable because of the changes in the sensitive loneliness questions mostly have been in the non-sensitive parts of reporting loneliness sometimes or seldom, in the most sensitive response reporting being lonely often there has instead been a decrease. Therefore the bias induced by methodological differences is not thought to have had such grave influences that they make comparisons impossible, instead they should be thought of as possible exaggerators of difference between the two cohorts in sensitive questions regarding loneliness.

*Implications for the understanding of changes of social relations of the young-old*

As stated previously, changes have occurred in social relations. This confirms our first hypothesis of change. In the *spectrum of frequency* it is mostly one of a shift to more organizational activity, more visits to and from acquaintances are also apparent and less individuals whom have a low frequency of social relations. In the *spectrum of contentment* there is instead a growing *mild* discontentment with ones social relations. The question we then

must ask ourselves is: how can these trends coexist? What do our results convey more than a confirmation of the rather mundane observation that there are isolated and also malcontent individuals? The answer to that question lies in the expectations of the inhabitants of this new part of the life-cycle Bernice Neugarten named the young-old (Neugarten 1974). The growing mild discontentment with social relations cannot convincingly be explained through a decrease of social relations in our data. Our analysis on the spectrum of contentment should also not be seen as measurement of loneliness among the old as these data are not showing a clear increase. It should instead be interpreted as a rather vague measure of contentment showing that the group with a mild to severe feeling of discontentment with ones social relations has grown. If there would have been a larger and more complex dataset the study could perhaps have differentiated between the mild and the severely malcontent, but unfortunately our dataset does not allow for such comparison. Compared to other typologies of social relations our results are similar but consist of only three types, with one diversified type one restricted and one which can be seen as a mix of the family and the friend focused. Limits of complexity in this material hamper more in depth comparisons.

These changes have also changed the way in which covariates correlate with social relations however the change in covariates seems not to predict any of the change in social relation, however one can add that our study does not adequately delve deep into this hypotheses. Gender was discussed earlier as a possible determinant for the realignment to a more organizational membership (meaning the more active participation of women out of the home). The other change was in five-year-mortality and the cause of this being significant in the second cohort but not in first, this might be due to the fact that many sudden causes of deaths that struck across all strata of society has decreased and the isolated and malcontent are now a more distinctly somatically frail group that have a higher risk of five-year-mortality after examination. Interestingly one of the large societal changes that also differ widely between the two cohorts: education, showed no relation to the latent classes. This is interesting from the perspective of prediction of these changes since it seem that our covariates could not convincingly be used as analytical explanations for most of the changes shown in social relations giving weight to the argument that this change shows generational characteristics and is not something that can be explained by the varying composition of the cohorts. However as several important covariates are missing this argument loses some of its

weight, therefore one cannot really say that the question have been answered on whether these changes can be traced as epiphenomena from other variables.

The study gives a hint of the historical processes that has influenced how 70-year-old perceive social relations which has also given rise to new expectations regarding social relations. As Mannheim points out new cohorts does not necessarily lead to new modes of thought and expression but the when accompanied by large societal change the cohorts themselves have to form "*distinctive pattern of interpreting and influencing the world" (Mannheim 1952/1928).* However these new and distinctive interpretations of the world do not have to be congruent in thought and deed and this dissonance is perhaps what is on display here. When changes social relations do not move in lockstep with changing expectations of social relations the dissonance between frequency and contentment becomes more palpable. It seems reasonable that this might be one expression of what Riley has named structural lag (Riley 1994), the tension created by more affluence and increased longevity have not yet created norms for the behavior of the young-old, their *distinctive pattern* is still being formulated, which could possibly lead to feelings of discontentment. However this is just one part of a more complex dynamic and observations of changes in social relations across the whole population would bring further insights into the underlying causes in changes in social relations. But because of the limitations of more complex analysis of social relations in the material (i.e. the material does not have exhaustive questionnaire items on several issues of social relations and also a lack of several important covariates) analyses cannot delve deeper into these questions than what was presented in the analysis.

Following from the line of reasoning presented in the discussion one should perhaps see this as an exploratory study that is both concerned with the changing face of ageing in connection to social relations and also attempts to analyze if the properties of social relation typologies in turn gives rise to different outcomes in other variables. This discussion therefore concludes with the conclusion that historical location logically influences social relation typologies but they can also influence the correlation of those patterns to even mortality. This of course has serious ramifications for perhaps a changing significance of social relations when judging policy measures directed at the young-old. But since this study has potential biases the results from this study have to be validated by further research.

*Concluding remarks and suggestions for future research*

Although the material is very rich and provides both depth and possibilities of cohort comparison, there were a great amount of obstacles that made some comparisons hard or almost impossible. For example, social class and subjective health variables would permit interesting analyses, this also true for other forms of social relations. This leaves us with the feeling that all was not seen and that there are things in the data that lie close but are still beyond our analytical reach.

As I hope also was made clear throughout the method and result section was that the quite advanced statistical techniques included in this thesis have not been deployed without tribulations. However I wish that what is conveyed to the reader in this thesis is that these problems have not been whitewashed or hidden but instead been discussed with analytical rigor. However one can also ask if this advanced statistical technique has led to any real interpretative gains compared to the very simple comparisons made in the beginning of the comparative section or have they instead clouded the vision by making attempts at complexity when there is little reason to do so. One reason for such critical posture would perhaps be the analysis of the *spectrum of frequency,* as has been noted there are several indicators of social relations that are not included and as such they might present a picture with latent class analysis that correspond to a very small piece of social relations and thus compromising too much when interpreting reality from data. The line of when to allow for this compromise is of course fuzzy. This study can only insist that the small piece of reality that is analyzed here have something important to say about the young-old. Unfortunately the compromise between data collection and complexity might almost always be somewhat unsatisfactory when working with data that was collected thirty years apart and especially from a different discipline. If researchers had no new ideas on how to design measurements and analyze after thirty years then cumulative knowledge most certainly would be a sham. Since this paper has used old material it is therefore ill suited to give suggestions on how to conduct future research since newer studies on social relations hopefully already have much more advanced research designs and instruments for measuring social relations that hopefully produces more valid measurements. However this study compared two different cohorts and from a cohort comparison perspective the message is clear to study designers

wanting to do a follow-up examination: do not change a thing! Changes in questionnaires and study design are the enemy of successful cohort comparison since they undermine valid comparison.

# Appendix

| Table 4. Information regarding model selection for latent class models of the spectrum of frequency. (N=individuals in sample (n=individuals used in estimation)) | | | | | | |
|---|---|---|---|---|---|---|
| Number of latent classes | Parameters | G² | *df* | AIC | BIC | log-likelihood |
| Entire sample (N=1493 (n=1470)) | | | | | | |
| 1 | | 1950.77 | 851 | 1974.77 | 2038.29 | -7933.80 |
| 2 | | 646.69 | 838 | 696.69 | 829.02 | -7281.77 |
| 3 | | 502.29 | 825 | 578.29 | 779.42 | -7209.56 |
| 4 | | Not well identified | | | | |
| 5 | | 393.74 | 799 | 521.74 | 860.49 | -7155.29 |
| 1971-72 (N=1007 (n=995)) | | | | | | |
| 1 | | 1433.82 | 851 | 1457.82 | 1516.68 | -5317.00 |
| 2 | | 504.55 | 838 | 554.55 | 677.17 | -4852.36 |
| 3 | | 402.06 | 825 | 478.06 | 664.44 | -4801.12 |
| 4 | | Not well identified | | | | |
| 5 | | Not well identified | | | | |
| 2000 (N=486(n=473)) | | | | | | |
| 1 | | 679.74 | 851 | 703.74 | 753.65 | -2450.89 |
| 2 | | 353.02 | 838 | 403.02 | 506.99 | -2287.53 |
| 3 | | 293.40 | 825 | 369.40 | 527.44 | -2257.72 |
| 4 | | 259.36 | 812 | 361.36 | 573.48 | -2240.70 |
| 5 | | Not well identified | | | | |

| Table 5. Multigroup model with *three* latent classes, models with constraints | | | | | | |
|---|---|---|---|---|---|---|
| Model | | G² | *df* | AIC | BIC | log-likelihood |
| 1 | No constraints | 695.45 | 1651 | 847.45 | 1249.72 | -7058.84 |
| 2 | Item response probabilities constrained across groups | 915.97 | 1687 | 995.97 | 1207.69 | -7169.09 |
| 3 | Latent class prevalence's constrained | 724.03 | 1653 | 872.03 | 1263.71 | -7073.12 |
| 4 | Latent class 1 prevalence constrained | 706.14 | 1652 | 856.14 | 1253.12 | -7064.18 |
| 5 | Latent class 2 prevalence constrained | 721.84 | 1652 | 871.84 | 1264.04 | -7072.03 |
| 6 | Latent class 3 prevalence constrained | 704.60 | 1652 | 854.60 | 1251.58 | -7063.41 |

| Table 6. Multigroup model with *three* latent classes, hypotheses test | | | | | |
|---|---|---|---|---|---|
| Model | | Difference G² | df | p-value | Reject H₀ |
| 1 | No constraints | - | - | - | - |
| 2 | Item response probabilities constrained across groups | 220.52 | 36 | <0.001 | Yes |
| 3 | Latent class prevalences constrained | 28.58 | 2 | <0.001 | Yes |
| 4 | Latent class 1 prevalence constrained | 10.69 | 1 | 0.001 | Yes |
| 5 | Latent class 2 prevalence constrained | 26.39 | 1 | <0.001 | Yes |
| 6 | Latent class 3 prevalence constrained | 9.15 | 1 | 0.002 | Yes |

| Table 7. Classification of individuals into latent classes from latent class model of spectrum of frequency. | | | |
|---|---|---|---|
| | Cohort born 1901-2 | | |
| | Latent class 1 | Latent class 2 | Latent class 3 |
| Percent (Frequency) | 45.94 (458) | 44.13 (440) | 9.93 (99) |
| Mean posterior probability | 0.9453108 | 0.9851942 | 0.9700419 |
| | Cohort born 1930 | | |
| Percent (Frequency) | 32.14 (152) | 63.85 (302) | 4.02 (19) |
| Mean posterior probability | 0.9745031 | 0.9963407 | 0.8817250 |

| Table 9. Odds ratios (95% CI) for **univariate** models of *spectrum of frequency,* predicting latent class membership. | | | | | | |
|---|---|---|---|---|---|
| Variable | | 1971 | | | 2000 | |
|  | Class 1(ref.) | Class 2 | Class 3 | Class 1(ref.) | Class 2 | Class 3 |
| *5-year survival* | | | | | | |
| Yes | Ref. | 1 | 1 | Ref. | 1 | 1 |
| No | | 0.856 (0.587, 1.247) | 1.905 (1.132, 3.206) | | 1.877 (0.516, 6.832) | 17.738 (3.831, 82.133) |
| *Gender* | | | | | | |
| Male | | 1 | 1 | | 1 | 1 |
| Female | | 0.597 (0.458, 0.777) | 0.928 (0.598, 1.441) | | 0.937 (0.634, 1.384) | 0.789 (0.303, 2.051) |
| *Relationship status* | | | | | | |
| In a relationship | Ref. | 1 | 1 | Ref. | 1 | 1 |
| Not in a relationship | | 0.929 (0.646, 1.336) | 4.020 (2.298, 7.033) | | 0.967 (0.543, 1.722) | 7.559 (2.625, 21.770) |
| Widowhood | | 1.077 (0.769, 1.509) | 3.557 (2.044, 6.192) | | 1.139 (0.640, 2.027) | 0.721 (0.084, 6.190) |
| *Grandchildren* | | | | | | |
| Yes | Ref. | 1 | | Ref. | 1 | 1 |
| No | | 0.753 (0.569, 0.996) | 1.497 (0.964, 2.327) | | 0.688 (0.429, 1.104) | 0.807 (0.252, 2.585) |
| *Education* | | | | | | |
| None-Elementary school | | 1 | 1 | | 1 | 1 |
| Secondary school/unfinished upper secondary school | | 1.185 (0.794, 1.769) | 0.779 (0.370, 1.640) | | 1.581 (0.982 2.547) | 0.447 (0.096, 2.071) |
| Graduation from upper secondary school /University | | 2.504 (1.214, 5.163) | n.e. | | 1.807 (0.989, 3.301) | 0.840 (0.175, 4.032) |

| Table 11. Information regarding model selection for the latent class models of spectrum of contentment. (N=individuals in sample (n=individuals used in estimation)) | | | | | | |
|---|---|---|---|---|---|---|
| Number of latent classes | Parameters | $G^2$ | *df* | AIC | BIC | log-likelihood |
| Entire sample (N=1493 (1468)) | | | | | | |
| 1 | | 1161.09 | 312 | 1183.09 | 1241.30 | -4448.65 |
| 2 | | 218.69 | 300 | 264.69 | 386.40 | -3977.45 |
| 3 | | 140.98 | 288 | 210.98 | 396.18 | -3938.60 |
| 4 | | 89.01 | 276 | 183.01 | 431.72 | -3912.62 |
| 5 | | Not well identified | | | | |
| 1971-72 (N=1007 (995)) | | | | | | |
| 1 | | 924.12 | 312 | 946.12 | 1000.05 | -2899.77 |
| 2 | | 155.81 | 300 | 201.81 | 314.57 | -2515.61 |
| 3 | | 94.60 | 288 | 164.60 | 336.20 | -2485.01 |
| 4 | | 69.65 | 276 | 163.65 | 394.08 | -2472.53 |
| 5 | | Not well identified | | | | |
| 2000 (N=486(473)) | | | | | | |
| 1 | | 316.55 | 312 | 338.55 | 384.30 | -1441.67 |
| 2 | | 117.46 | 300 | 163.46 | 259.12 | -1342.12 |
| 3 | | 75.32 | 288 | 145.32 | 290.89 | -1321.05 |
| 4 | | Not well identified | | | | |
| 5 | | Not well identified | | | | |

| Table 12. Multigroup model with *two* latent classes, models with and without constraints | | | | | | |
|---|---|---|---|---|---|---|
| Model | | $G^2$ | *df* | AIC | BIC | log-likelihood |
| 1 | No constraints | 273.27 | 601 | 365.27 | 608.69 | -3857.73 |
| 2 | Item response probabilities constrained across groups | 494.85 | 623 | 542.85 | 669.85 | -3968.52 |
| 3 | Latent class prevalence's constrained | 283.54 | 602 | 373.54 | 611.67 | -3862.87 |

| Table 13. Multigroup model with *two* latent classes, hypotheses test | | | | | |
|---|---|---|---|---|---|
| Model | | Difference $G^2$ | df | p-value | Reject $H_0$ |
| 1 | No constraints | - | - | - | - |
| 2 | Item response probabilities constrained across groups | 221.58 | 22 | <0,001 | Yes |
| 3 | Latent class prevalence's constrained | 10.27 | 1 | 0.001 | Yes |

**Table 14. Classification of individuals into latent classes from latent class model of spectrum of contentment.**

|  | Cohort born 1901-2 |  |
|---|---|---|
|  | Latent class 1 | Latent class 2 |
| Percent (Frequency) | 78.89 (785) | 21.11 (210) |
| Mean posterior probability | 0.98 | 0.98 |
|  | Cohort born 1930 |  |
| Percent (Frequency) | 68.29 (323) | 31.71 (150) |
| Mean posterior probability | 0.90 | 0.94 |

**Table 15. Odds ratios (95% CI) for univariate models of *spectrum of contentment*.**

|  | 1971-2 | | 2000-3 | |
|---|---|---|---|---|
| Variables | Latent class 1 (ref.) | Latent class 2 | Latent class 1 (ref.) | Latent class 2 |
| *5-year survival* |  |  |  |  |
| Yes | 1 | 1 | 1 | 1 |
| No |  | 1.314 (0.877, 1.968) |  | 3.925 (1.513, 10.184) |
| *Gender* |  |  |  |  |
| Male |  | 1 |  | 1 |
| Female |  | 2.346 (1.694, 3.248 ) |  | 2.050 (1.376, 3.054) |
| *Relationship status* |  |  |  |  |
| In a relationship | Ref. | 1 | Ref. | 1 |
| Not in a relationship |  | 1.838 (1.190, 2.839) |  | 2.854 (1.681, 4.846) |
| Widowhood |  | 5.724 (3.968, 8.257) |  | 3.178 (1.841, 5.486) |
| *Grandchildren* |  |  |  |  |
| Yes |  | 1 |  | 1 |
| No |  | 0.891 (0.644, 1.232) |  | 0.802 (0.489, 1.316) |
| *Education* |  |  |  |  |
| None-Elementary school | Ref. | 1 | Ref. | 1 |
| Secondary school/unfinished upper secondary school |  | 0.818 (0.500, 1.337) |  | 1.095 (0.692, 1.734) |
| Graduation from upper secondary school /University |  | 0.582 (0.223, 1.517) |  | 0.887 (0.498 1.580) |
|  |  |  |  |  |

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