Effects of Cumulative Disadvantage and Disruptive Life Events on the Physical and Mental Health of Individuals between the Ages of 50 – 74 years: Analysis from the Swiss Household Panel (SHP)

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1   Cumulative disadvantage, life course and health

Cumulative advantage/disadvantage theory is expanding and gaining in importance in social gerontological research. Age and cumulative advantage/disadvantage theories have obvious logical, theoretical, and empirical connections, because both are inherently and irreducibly related to the passage of time.

This article reviews the cumulative advantage/disadvantage perspective in ageing and life course research and proposes to test various time ordered models to evaluate health determinants by using the Swiss Household Panel Data.

1.1   The life course cumulative disadvantage/advantage theory

The age-stratification (Riley et al, 1972; Riley, 1987), the life course (Elder, 1985) and the life span developmental perspectives (Baltes et al., 1980, 1990) are crucial approaches in the field of ageing. The concept of cumulative advantage/disadvantage is often attributed to the first writings of Derek Price in 1965 and Robert Merton in 1968. Advances in analysing both cohort processes and age-related socio-structural processes laid the foundations for applying cumulative disadvantage theory to questions of population and individual ageing. Gerontologists have recognized the neglected aspects of individual and cohort ageing and the need to look beyond age-based generalizations to examine more closely key characteristics of life trajectories and life cycles, as well as the factors that produce them such as early childhood peculiarities, life events, period effects, etc. The interest lies in analysing the extent to which observed age differences and age-related variability result from systemic life course processes and to identify individual trajectories within period- or cohort-effects.

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Over the past 15 years, these connections have resulted in the elaboration and application of the cumulative advantage/disadvantage perspective in social gerontology. Based on Merton's (1988) description of cumulative advantage as dealing with "the ways in which initial comparative advantage of trained capacity, structural location, and available resources make for successive increments of advantage such that the gaps between the haves and the have-nots widen" (p. 606), Dannefer (2003) proposes the definition of cumulative advantage/disadvantage as *the systemic tendency for inter-individual divergence in a given characteristic (e.g. money, health or status) with the passage of time*" (p. 327).

The theoretical framework of cumulative advantages/disadvantages is still forming and evolving among researchers. Applying this concept to ageing and health research in old age allows us not only to integrate life course theories from a different perspective but more importantly to test different factors known as key health determinants over the life course.

The first part of this article reviews the specific role of different life course factors found to affect health status in one way or another.

1.2   Health in old age from a life course perspective

The theoretical origins, connections, and implications of cumulative advantages/ disadvantages are not widely understood and have not yet been systematically integrated into research on health determinants of old age in a life course perspective. Through a number of population studies over the years, health status is known to be inversely related to age and has been attributed not only to the consequence of diverse bio-physio-psychological processes but also to socio-cultural and environmental factors. Furthermore, the association between age and health, has been shown to be strongly linked with socio-economic status (SES). Better health is found in a population of same age groups if the SES is higher. In a longitudinal perspective, the onset of health problems is usually postponed until later in life among persons with higher SES, while health declines are prevalent in lower SES groups by middle age (e.g. House et al. 1994, p. 213). Therefore, SES is a central factor in the modelling of cumulative disadvantages/advantages leading to good/bad health status in advanced age.

In terms of the timing of events, current advances in the understanding of differences in health point to the short and long term negative effects of cumulative disadvantages on physical and mental health over the life course. With regard to health, some risks are immediate in their effects, but others become manifest only after an extended period of time. These "long-term effects" can be expected to be most prominent in later life. For example, events that are either serious in their impact on health (i.e. disability after an accident, depression in early age) or difficult conditions that are chronic throughout the life course can be expected to have a greater impact in later life.

The life course perspective in health research has only been taken into consideration over the last decade despite the strong body of evidence of a causal link between diverse biological, physical, mental, socio-economic and environmental risk factors and morbidity and mortality. Putting those links into both a life course perspective and more specifically into a cumulative advantage/disadvantage framework is recent. Population health studies of late adulthood and old age have thus become a field involving multidimensional factors in the explanation of health status. *"The life course perspective considers the social and physical hazards, and the resulting behavioural, biological and psychosocial processes, that act across all stages of the life span – gestation, infancy childhood, adolescence, young adulthood and midlife – to affect risk of disease later on."* (WHO, 2001, p. 8). This new perspective in research seeks to underline the causal effect of early life factors such as foetal growth, breastfeeding, malnutrition and infection in childhood, or tobacco and alcohol abuse in adolescence and adulthood, on diseases in later life.(Frankel et al. 1996; Kuh and Ben-Shlomo, 1997, WHO, 1999). While behaviour and lifestyles are well-recognized influences among health specialists, broader social and economic factors have not been given enough attention outside the sociological domain. Today those factors, such as socio-economic status, level of education, housing, cultural factors, social support and environment tend to be systematically taken into account (WHO, 1998).

Despite the complexity and difficulty of the challenge of addressing cumulative advantage/disadvantage in a life course perspective, a critical mass or body of evidence has accumulated in the last decade. Interest in the life course perspective resides in its potential for shaping policy.

1.3 Influence and measurement of specific factors over time

The literature consistently underlines the fact that the effects of socio-economic differences on health persist across the life span. Indeed, from the point of view of the cumulative advantage/disadvantage hypothesis, the relationship between many types of social status and health increases in strength (Dannefer, 1987, 1988a, 1988b; O'Rand, 1996). For example, Crystal and Shea (1990), using the Census data, suggested that socio-economic differences are greatest among elderly people.

The literature adopting a cumulative advantage/disadvantage perspective on health at advanced ages has consistently underlined a range of factors affecting old age that can be highlighted by the following key issues:

– *Childhood Experiences and Family Background:* There is growing evidence that childhood adversity linked to social inequalities in childhood has important consequences for health later in life (see Barker, 1998; Brunner et al., 1996; Costa, 1999; Hayward and Gorman, 2004; Kuh and Ben-Shlomo, 1997; Lynch, Kaplan and Salonen, 1997; Power and Peckham, 1990; Schwartz et al., 1995;). Recent evidence suggests that a family's SES background and

pre-adult intellectual resources have a significant effect on health outcomes at midlife, but that they may be entirely mediated by adult achievements (Wray, Alwin and McCammon, 2003). These results underscore the importance of assessing total effects rather than direct effects in assessing the influences of SES factors across the lifespan.

—   *Educational Levels:* The positive relationship between levels of schooling (or education) and health is one of the strongest and best documented linkages in this area (e.g., Adler et al., 1993 1994; Ross and Mirowsky 2003, 1999; Ross and Wu, 1995 1996). Summarizing their research on education levels, Mirowsky and Ross (2003) argue that the amount of schooling creates most of the relationship between achieved social status and health, and that it is primarily through the increased sense of personal control that results from higher levels of schooling that greater health outcomes are achieved. Ross and Wu (1996) were amongst the first to propose applying the theory of cumulative advantage to health on a sample of 2,436 respondents at two points in time. They found that the gap in health status variables among people with high and low educational attainment increased with age. Therefore, low educational attainment is expected to have an impact on health status in later life, although gender differences may occur in the different age cohort as a result of women's access to education in those specific cohorts.

—   *Socio-economic Status (SES):* The strong relationships in the socio-economic status differential in health and mortality have been well described and summarized in empirical studies and review articles indicating that socio-economic status (SES) is positively associated with health: well-educated, higher household income, upper socio-economic status people enjoy longer lives in good health but also consistently report better health and higher satisfaction with their health (e.g., Adler et al., 1994; Ettner, 1996; Lantz et al. 2001; Meyer, 2000; McDonough et al., 1998; Phelan et al., 2004; Ross and Wu, 1995; Thiede and Traub 1997). Although some researchers (e.g., see Smith, 1998, 1999) have argued that the direction may be reversed (e.g., health determines socio-economic status), most researchers conclude that socio-economic status is causally subsequent to education levels. Early socio-economic disadvantage in life as a key predictor of health status in old age has been demonstrated by several studies using retrospective reporting of social and economic status at different stages of the life course (Marmot, 2000, 2005; Singh-Manoux et al., 2004; Marmot and Shipley, 1996). Analyses have addressed specific health problems such as coronary heart disease (Wamala, Lynch and Kaplan, 2001), obesity (Ferraro and Kelley-Moore, 2003), or onset of health transition such as early menopause (Lawlor et al., 2003), yet available research has barely addressed the systematic link between health parameters and cumulative effects of SES and life events at different points in time. Therefore, low socio-eco-

nomic status in early years is expected to have an impact on the health status later in life, especially among those who have chronically low SES throughout their lives.

— *Life events and chronic conditions or incapacities* have been related, in a wide range of studies, to mental and physical health outcomes (Thoits 1995). Following Brown and Harris (1978, 1989) studies have consistently shown the significant negative effects of life events on physical and mental health (Creed 1985, Thoits 1983) and stressed the importance of considering life events in a cumulative advantage/disadvantage model.

— *Social networks and social support:* The favourable impact of *social network and social support* on health has been evidenced in a large number of studies (Berkman 1984, Berkman and Glass 2000, Thoits 1995, Zimmermann and Haour-Knippe 1988). Social networks not only provide the basis for social control and support but also a sense of belonging and responsibility towards others. Social support is a particularly valuable coping resource in the case of adverse life events and other deleterious factors. Social and emotional support appears to have a major buffering effect with regard to health (Meyer, 2000). Therefore, a lack of social network is expected to have a negative impact on the health status of the aged.

— *Gender differences:* decades of research studies have provided evidence of *gender differences* in the prevalence of many diseases, disability, and mortality (Gutzwiller et al., 1986; Zemp et al., 1996 ; Gognalons-Nicolet, 1997; Meyer, 2000) and many reviews and explanations on this gender differential over the life course have been published (i.e. Macintyre, Arber and Khlat, 2002; Verbrugge, 1985, 1987; Waldron, 1983; Stuckelberger, 1997, 1999; Stuckelberger and Höpflinger, 1996, 1998). The gendered nature of life course trajectories clearly structure and constrain the health-related resources and opportunities of men and women (Moen, 2003). Those factors may work additively or they may interact with one another to produce gender differences in health. We expect to find variations in the different life course factors affecting later life health status in the way that women might accumulate many negative conditions (e.g. low education, lower income, etc.).

Different *methodologies* have been used to analyse cumulative advantage/disadvantage over time. In general, their roots can be found in studies of socio-economic differences in cohort follow up studies which concluded in the accumulation of circumstances resulting in an increase in mortality or unfavourable health parameters.

Measurements of cumulative advantage/disadvantage in old age have been studied for a decade although they do not appear to have prominence in gerontological and epidemiological studies up to now. Very few research undertakings in social epidemiology have established the importance of considering the accumulation of advantage and disadvantage during the life course when examining adult and old

age health outcomes (Ross and Wu, 1996). While the bi-variate correlation between health status in old age and level of education and socio-economic conditions early in life has been well demonstrated in different countries as well as in Switzerland (Gutzwiller, et al. 1986, Meyer, 2000; Minder 1993), cumulative disadvantages at different stages of the life course have never been studied before with a Swiss sample.

From the above review of factors contributing to cumulative disadvantage/advantage, it appears that a classification can be made between a) variables fixed during the youth period, b) variables that intervene during the life course, and c) recent and current conditions. All of them can have direct and indirect effects on the health status of higher age groups. This sequence constitutes the methodological rationale for the models we propose to test in this article.

1.4   Research questions addressed and hypotheses to be tested

Age and cumulative advantage/disadvantage theories have evident logical, theoretical, and empirical links, as both are inherently and irreducibly related to the passage of time. Over the past 15 years, these links have resulted in the elaboration and application of the cumulative advantage/disadvantage perspective in social gerontology. However, the theoretical origins, connections, and implications are not widely understood (Dannefer, 2003).

As just described, factors and living conditions proven to have an impact on late life health status are many, diverse and often inter-related. The cumulative advantage/disadvantage theory objectives consist in integrating and testing those factors to see which one is more prevalent depending on the situations and diversity of the population. While early advantages and privileges are likely to lead to further advantages, being disadvantaged will require greater effort to attain the same social or health status. If early disadvantages are not overcome, additional risks will challenge the effective performance of roles and in turn influence health, wealth and well-being later in life (Ferraro, 2001:324). Despite the fact that cumulative disadvantage/advantage theories have not yet been explicitly tested, the existing results from Swiss Health Surveys consistently confirm the empirical relevance of the above socio-economic determinants of health (Gutzwiller et al., 1986; Meyer, 2000; Minder, 1993; Wanner et al, 2003; Höpflinger und Stuckelberger, 1999; Calmonte, Koller and Weiss 2000); Zimmermann and Burton-Jeangros (2004).

Based on the literature concerning life course factors which influence health status in old age, the following research questions will be addressed by our study of men and women aged 50 and above participating in the SHP during the years 1999–2003:

–   To what degree does the recent and current situation determine current ill-health?

- To what degree do inequality and disadvantages during youth contribute to current ill-health? Does early disadvantage affect physical, mental and functional health differently?
- Do disadvantages early in life have a stronger effect than life course events on physical, mental and functional health? What are the indirect effects on health?

Therefore, the purpose of this study is to analyse the relationships between cumulative disadvantages and health by looking at the different pathways through which health might be affected by situations and events encountered during the entire life course.

According to the general perspective on "Cumulative Disadvantages in Health" various sets of factors have been selected on the basis of the literature as key determinants of ill-health at every stage of the life course (see figure 1 in chapter 2.2 for the specification of the general model). The main hypothesis to be explored relates to the temporal ordering of the determinants proven to have a negative impact on health. Beyond the recent and current situation, we expect the disadvantaged living conditions and life events experienced earlier in life to affect directly and indirectly the current health status of the elderly under investigation.

2   Data and models

The cross-sectional and longitudinal data derived from the Swiss Household Panel (SHP) offers a unique opportunity to assess the impact of cumulative disadvantages over time (www.swisspanel.ch).

2.1   The Swiss Household Panel

The *sample* of the Swiss Household Panel (SHP) is a stratified random sample of private households whose members represent the non-institutional population resident in Switzerland. This sample has been interviewed on a yearly basis since 1999. For the first wave in 1999, slightly over 5,000 households and almost 8,000 individuals were successfully interviewed, the age ranging from 14 years upwards.

The present analysis is based on the sub-sample of the population aged 50 to 74 years old and consistently interviewed in each of the first five waves comprising 1,257 persons, 511 men and 746 women. In 1999, the mean age of the respondents was 60.4 years, 60.6 for men and 60.3 for women. The data is weighted longitudinally in order to compensate for drop-outs during the years 1999–2003.

The longitudinally weighted sample comprises 541 men and 717 women. Panel attrition over time is partly due to ill health and death, which induces a survival effect in our sample with a healthier cohort in 2003 than in 1999[1].

In addition to the yearly panel interviews, *retrospective information* was collected using two data collection methods: (1) a one-time supplementary CATI module on each person's *social origin* regarding their own youth and the SES of both parents during the first wave in 1999, and (2) a mail questionnaire on the *personal biography* sent individually to all persons who had responded to the first two panel waves in 1999 and 2000[2]. A total of over 1,000 variables were derived from the different questionnaires. The data has been made available to a large network of researchers (Zimmermann, Budowski et al. (2003); Zimmermann and Tillmann (2004).

2.2   Models of cumulative disadvantage and health in older age

In order to identify a predictive model of cumulative disadvantages in health, the analysis proposed here considers the current health status as the *dependant variable*, and factors reflecting disadvantages during childhood and over the life course, as well as current socio-economic status and recent harmful life events as *independent variables* (figure 1).

Self-rated health is a measure that is regularly used and has been found predictive of future health events including mortality (for recent reviews see: Idler and Benyamini 1997; Stuckelberger, 2000). In the present study, health status is measured through self-reported assessments of *physical, mental* and *functional health* for each of the years 1999 to 2003.

The independent variables included in the model and comprising the hypothesized antecedent risk factors for ill-health are explored retrospectively through:

I   *Youth period risk factors*: *disadvantages in youth* were measured by three variables: a) living with/without parents at age 15, b) the parents' SES and c) financial difficulties experienced during the youth period.

II   *Life course risk factors*: *major events* during the life course were identified through variables such as separation and divorce, widowhood, and death of one or both parents.

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1   On the basis of the first wave data in 1999, panel survivors show significantly better *physical health* (19.3% versus 26.3% of physical ill-health, p < .000) and suffer less from *health impediments* than non-survivors (1.88 versus 2.22, p = .003), but do not differ with respect to their *mental health status* (1.64 versus 1.62, p = .840).

2   The biographical questionnaires were mailed by post during the years 2001-2002. Completed biographical questionnaires are available for 5,560 individuals. The crude participation rate was 54.6%, considering the availability of biographical information based on all eligible persons aged 14 years and more (5,560 from 10,180). Amongst the persons who have fully responded to the first five panel waves (1999-2003), 80% completed the biographical questionnaire. For the present longitudinal sample of the 50 to 74 years old, the participation rate was 81% (1,017 out of 1257 persons).

III   *Long standing health problems* are defined by the presence of a health problem at the time of the first interview carried out in 1999.

IV   *Recent and current situation*:

    a)   *Socio-economic status (SES) and socio-demographic characteristics*: highest education attained, household income, age and ethnicity.

    b)   *Short-term "negative" life events since 1999* to 2003 according to an index of 8 disruptive events (illness of or accident to self or close person, death of close person, termination of / conflicts in relationships, etc.).

    c)   *Social support/social network*: Social support will be measured by the number of persons reported as part of the supportive network and the potential practical and emotional support.

The detailed presentation of the operational definitions regarding health and its determinants can be found in the appendix.

Figure 1:   The general model of cumulative disadvantages as determinants of current health
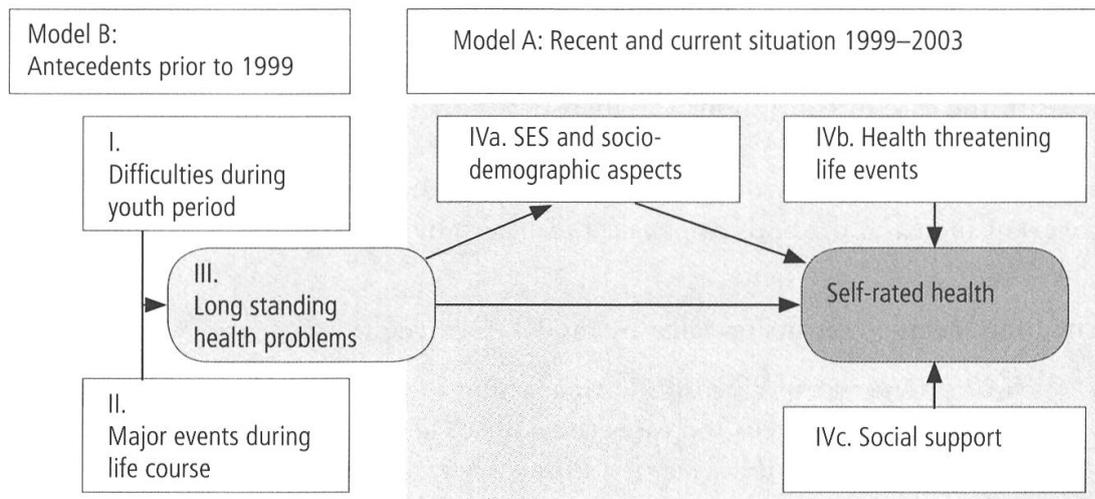
3   Data analyses and findings

The *cumulative disadvantage theory* will be evaluated using the three periods of the life course: *youth*, *life course* and *current period* variables from the general model (Figure 1). The predictive power of those variables will be considered as to their impact on current physical, mental and functional health assessments.

    First, models A and B will be tested separately, then combined in order to establish the direct and indirect pathways through which disadvantages experienced at different life periods might accumulate. Model A relates recent and current conditions experienced during the years 1999–2004 to the perceived health outcomes

for the same period. Model B tests for the possible direct and indirect effects of antecedent conditions prior to 1999.

Throughout all the analysis, the *dependant health variables* are *dichotomised* in order to assess relative risks of ill-health by means of logistic regression analysis. The *independent variables* are either *categorical* (e.g. *ordinal* = household income quintiles, social support), *dichotomous* *(*Swiss versus foreign status) or *continuous* (age, total number of negative life events).

3.1   Model A: Recent and current situation as determinants of ill-health

Model A tests for the classical determinants of health: socio-economic status, health threatening life events and social support, with age and nationality as controls.

The logistic regression results displayed in table 1 identify the variables in model A as powerful determinants of physical ill-health and functional disability (ADL) as judged by the Pseudo R^2 de Nagelkerke: $0.15 < R^2 < .31$.

Health threatening life events and lack of social support are stronger determinants of ill-health compared to socio-economic status and living conditions; on the other hand, persons living in households with the *lowest income level* (up to 30,000 CHF per year) have 4.1 times a risk of ill-health compared to persons living in households with the highest incomes (70,501 CHF and higher).

In the case of continuous variables (e.g. age), the value of the adjusted odds ratio (an OR) shows the average unit increase or decrease: (i) the odds of poor mental health decrease with each year of age by 0.962, (ii) each additional negative life event increases the odds of physical ill-health by 20 to 30 percent (Odds ratios of 1.2 and 1.3).

The more detailed results revealed by model A are (table 1):

— *Health threatening life events* have a strong impact on ill-health: on average, every additional event increases the odds of ill-health by 20 to 30 percent.

— Overall, *low household income* is a strong determinant of ill-health, be it physical or mental. The two lowest income quintiles carry very high odds ratios. The effects of low household income appear to be much stronger for men than for women and reflect a differential effect of financial difficulties that can refer to the importance of man's role as a financial support in the older generation. This may be because older Swiss women are more inclined to have taken on the well-known traditional "Swiss 3Ks" family role ("Kinder, Küche, Kirche" standing for "children, kitchen, church") (Stuckelberger et Höpflinger, 1996, 1998).

— *Lack of social support* is a consistently strong direct predictor of ill-health: the 20% of persons estimated to have enjoyed very little social support (about 3–4 points on a 10 point scale) have a 3 to 4 times higher risk of ill-health.

Table 1:   Current conditions and health 1999–2003
                  (model A logistic regressions)

Determinat in model A: recent and current situation		Poor Physical Health	a OR (95% CI)	Poor Mental Health	a OR (95% CI)	Strong Health Impen-diments	a OR (95% CI)
Age in 1999	(covariate)	n.s.		0.962	0.93–0.99	n.s.	
Highest educational level attainded	1 Compulsory education	n.s.		n.s.		n.s.	
	2 Upper secondary						
	3 Higher education						
HH-Income equivalised SKOS 1999–2003 (quintiles)	1 Low –30000	4.1	2.3–7.3	2.3	1.4–3.9	3.3	1.9–5.7
	2 30001–40500	5.5	3.2–9.5	2.3	1.3–3.5	3.0	1.8–5.2
	3 40501–52500	2.1	1.2–3.8	2.3	1.4–3.7	2.2	1.3–3.8
	4 52501–70500	1.2	0.7–2.2	1.1	0.7–1.9	1.4	0.8–2.3
	5 70501–High	1.0	----	1.0	----	1.0	----
Nationality in 1999	0 Swiss	n.s.		1.0		1.0	
	1 Foreign			1.7	1.1–2.5	1.9	1.2–2.5
Number of Life Events 1999–2003	(covariate)	1.3	1.2	1.2	1.1–1.2	1.3	1.2–1.4
Practical Support 1999–2003 (quintiles)	1 Very low	3.0	1.7–5.2	n.s.		2.3	1.3–3.9
	2 Low	2.1	1.2–3.6			1.3	0.7–2.2
	3 Medium	1.2	0.7–2.3			1.6	0.9–2.8
	4 High	1.4	0.8–2.4			1.4	0.8–2.4
	5 Very high	1.0	----			1.0	----
Emotional Support 1999–2003 (quintiles)	1 Very low	n.s.		3.8	2.3–6.4	n.s.	
	2 Low			2.3	1.4–3.9		
	3 Medium			1.5	0.8–2.5		
	4 High			1.5	0.9–2.6		
	5 Very high			1.0	----		
	Pseudo R² (Nagelkerke)	0.232		0.151		0.194	
	−2 Log Likelihood	947.6		1103.0		955.3	
	D.F.	9		11		10	
	N =	1207		1207		1207	

Once a medium level of social support is obtained, further support does not significantly decrease the risk of ill-health.[3]

— *Age* has a significant effect on mental health and functional status. The risk of mental ill health tends to decline with each additional year of age, while daily ailments increase slightly. We cannot exclude from this result a positive selection bias; the drop-outs of subsequent waves could be more prevalent in the population with severe health problems.

— Contrary to most findings in the literature, *level of education* remains unrelated to ill-health after controlling for household income. This could be a result specific to this older generation. For younger men and women, education appears to have greater importance than income (Zimmermann and Jeangros, 2003).

— *Foreign nationality* constitutes a different health risk for men and women. Foreign men have more than twice the risk of living with a functional ailment in their daily activities compared to their Swiss counterparts. Foreign women are at a higher risk of mental ill health (a OR = 2.2). After immigrating to Switzerland, the majority of aged foreigners had often worked during their life course in the primary sector under working conditions requiring heavy physical strains and loads. These conditions have been proven to affect their health and the risk of chronic disease in old age (Bolzman, Fibbi et Vial, 1996; Höpflinger et Stuckelberger, 1999).

3.2 Model B: Disadvantages in youth and life-events during the life-course as direct and indirect determinants of ill-health

Disadvantages in youth and life-events during the life-course appear to be significant, but relatively weak direct determinants of current ill-health (.035 < Pseudo R^2 < .076) (table 2).

Financial difficulties, which were encountered *during youth,* are related not only to current *physical ill-health* and *health impediments,* but also to the presence of *long-standing chronic health problems.* Respondents, having experienced lasting financial difficulties during their youth, are 2.4 times more likely to suffer from long-standing health problems than respondents who have never had such difficulties.

Persons whose *parents* were *both of low educational level* are twice as likely to suffer from mental ill health than those with at least one parent of higher education. In addition, persons who have experienced *separation and/or divorce* during their life-span are also twice as likely to suffer from mental ill health than those without

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3   As practical and emotional social support are strongly correlated (r > .80), it is impossible to distinguish statistically the unique effect of each source of support: nevertheless, the results suggest that practical support is somewhat more strongly related to physical health and emotional support to mental health.

Table 2:   Logistic regression of variables in model B – disadvantages in youth and life-events during life-course – total (n = 939*)

Antecedents prior to 1999 – Model B		Poor physical health	a OR (95% CI)	Poor mental health	a OR (95% CI)	Strong health impediments	a OR (95% CI)	Long standing health problems	a OR (95% CI)
Living with parents or not at age 15	0 Both parents	1.0	----	1.0	----	1.0	----	1.0	----
	1 else	n.s.		n.s.		n.s.		n.s.	
Financial difficulties during youth	0 never	1.0	----	1.0	----	1.0	----	1.0	----
	1 at certain times	2.1	1.4–3.3	n.s.		2.0	1.3–3.2	1.8	1.2–2.6
	2 nearly all the time	1.7	1.1–2.6	n.s.		2.6	1.7–4.0	2.4	1.7–3.4
Low education of both parents	0 not low	1.0	----	1.0	----	1.0	----	1.0	
	1 low	n.s.		1.7	1.2–2.4	1.5	1.0–2.1	n.s.	
Life-time separation-divorce-BioQuest0120*	0 no	1.0	----	1.0	----	1.0	----	1.0	----
	1 yes	n.s.		1.8	1.2–2.6	n.s.		n.s.	
Life-time widowhood-BioQuest0120	0 no	1.0	----	1.0	----	1.0	----	1.0	----
	1 yes	1.9	1.1–3.0	2.0	1.3–3.2	n.s.		n.s.	
Death of parents-BioQuest0120	0 both parents alive	1.0	----	1.0	----	1.0	----	1.0	----
	1 one parent dead	n.s.		n.s.		n.s.		n.s.	
	2 both parents dead	n.s.		n.s.		n.s.		n.s.	
	Pseudo R² (Nagelkerke)	0.035		0.043		0.058		0.039	
	−2 Loglikelihood	788.7		894.4		780.6		1025.7	
	D.F.	3		3		3		2	
	N =	939		939		869		939	

* Missing cases are due to lack of information from the biographical questionnaire.

such an experience. However, separate analyses – not shown here – indicate that these antecedent conditions and life events affect the current mental health status of women only and not of men.

Above and beyond the rather weak direct effects of antecedent factors, such *disadvantages during youth* and *major events experienced during the life course,* appear to have *indirect* influences on current health by affecting the following variables (table 3):

– *Current living standard*: the low SES of parents determines to a certain extent both the current household income and the presence of long-standing health problems. Not surprisingly, the parents' low educational level leads to a lower current household income for the elderly respondents, which, in turn, negatively affects their current health. For *women*, widowhood lowers the present available household income and for *men*, the death of the parents tends to have a similar impact.

— *Levels of social support*: a low level of education of both parents and the loss of a spouse/partner by separation or death negatively affects the perceived level of social support. For women, these factors have not only a much stronger impact, but the death of their parents appears to further weaken the social support they enjoy.

Table 3:   OLS regression of variables in model B – the impact of disadvantages in youth/life-events during life-course on current income and emotional support

Dependent Variable: Average household-income 1999–2003 (Log LN), n = 895

	B	Std. Error	Beta	t	Sig. p
(Constant)	10.97	0.02		556.5	0.00
Low education of both parents	-0.24	0.04	-0.22	-6.8	0.00
Lifetime widowhood	-0.21	0.05	-0.13	-4.0	0.00
a R^2 = 0.073					

Dependent Variable: Average Emotional Social Support 1999–2003, n = 924

	B	Std. Error	Beta	t	Sig. p
(Constant)	29.602	0.293		100.9	0.00
Lifetime widowhood	-5.27	0.69	-0.24	-7.6	0.00
Lifetime separation-divorce	-2.78	0.56	-0.16	-5.0	0.00
Low education of both parents	-1.86	0.48	-0.12	-3.9	0.00
a R^2 = 0.094					

Results form OLS Regression with step-wise inclusion and elimination procedure.

3.3   Combined models A and B

The combination of models A and B considerably improves the statistical fit of current health conditions[4] (table 4).

Above and beyond the current conditions of model A, current health status is strongly determined by *long-term health problems* (model B), which are more prevalent among persons who have experienced adverse circumstances in their youth, particularly persistent poverty. However, none of the other factors of model B have an additional direct impact on current health.

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4   The Chi² Test-Statistics for the difference between model A versus models A-B are highly significant (p < .000): a) Poor physical health (-2 Log Likelihood = 80.2; D.F. = 1; p < .000), b) Poor mental health (-2 Log Likelihood = 16.6; D.F. = 1; p < .000), a) Strong health impediments (-2 Log Likelihood = 139.9; D.F. = 1; p < .000)

Table 4: Current conditions, long term health problems or disability and health 1999–2003 (model A-B logistic regressions)

Health determinants of model A–B		Poor physical health	a OR (95% CI)	Poor mental health	a OR (95% CI)	Strong health impendiments	a OR (95% CI)
Age in 1999	(covariate)	n.s.		0.96	0.94–0.99	1.03	1.0–1.06
Highest educational level attained	1 Compulsory education	n.s.		n.s.		n.s.	
	2 Upper secondary						
	3 Higher education						
Household-income equivalised SKOS 1999–2003 (quintiles)	1 Low −30000	5.0	2.7–9.0	2.4	1.4–4.0	3.7	2.0–6.9
	2 30001–40500	6.2	3.5–10.9	2.1	1.3–3.5	3.4	1.9–6.1
	3 40501–52500	2.0	1.1–3.7	2.2	1.4–3.6	2.1	1.2–3.8
	4 52501–70500	1.2	0.7–2.3	1.1	0.7–1.8	1.4	0.8–2.5
	5 70501–High	1.0	----	1.0	----	1.0	----
Nationality in 1999	0 Swiss	n.s.		1.0	----	1.0	----
	1 Foreign			1.7	1.1–2.5	2.0	1.2–3.3
Number of life events 1999–2003	(covariate)	1.2	1.1–1.3	1.2	1.1–1.2	1.2	1.2–1.3
Practical support 1999–2003 (quintiles)	1 Very low	3.3	1.8–5.9	n.s.		2.1.	1.1–3.8
	2 Low	2.1	1.1–3.7			1.1	0.6–2.0
	3 Medium	1.3	0.7–2.4			1.6	0.8–2.9
	4 High	1.5	0.8–2.7			1.5	0.8–2.7
	5 Very high	1.0	----			1.0	----
Emotional support 1999–2003 (quintiles)	1 Very low	n.s.		3.7	2.2–6.3	n.s.	
	2 Low			2.3	1.4–3.8		
	3 Medium			1.4	0.8–2.5		
	4 High			1.5	0.9–2.6		
	5 Very high			1.0	----		
Long term health problems or disability	0 No	1.0	----	1.0	----	1.0	----
	1 Yes	5.0	3.5–7.1	1.8	1.3–2.5	8.3	5.7–11.9
	Pseudo R² (Nagelkerke)	0.319		0.164		0.356	
	−2 Log Likelihood	867.4		1086.4		815.4	
	D.F.	10		12		11	
N =		1207		1207		1207	

4   Overview of results and discussion

4.1   Overview of results

For the population aged 50 to 74 years, the analyses of the Swiss Household Panel data demonstrate that early life disadvantages and events during the life course can have both direct and indirect effects on the physical, mental and functional health (figure 2).

Figure 2:   Main results : direct and indirect effect models A and B
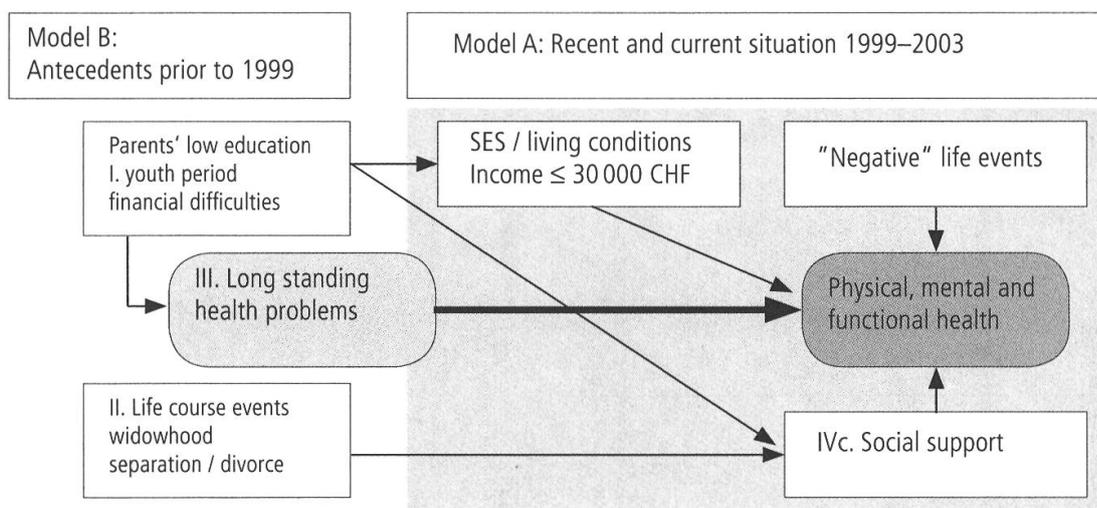
Results in respect of the *direct effects* evidence the fact that *current health status* is strongly determined by *current living conditions* (especially household income), *social support and* recent *negative life events* (Model A).

With the exception of *long standing health problems,* the other antecedent factors such as d*isadvantages during youth* and *life-events during the life course* are relatively weak *direct* determinants of current health status (Model B). They mainly influence current health *indirectly* by making chronic health problems more likely and by negatively affecting current household income and social support. Consequently, the combination of models A and B provides a considerable improvement of the models' fit.

4.2   Discussion

The results show interesting links and modulating factors between life course advantages/disadvantages and health status. While some results confirm the well-known link between chronic illnesses, lack of social support, low income and recent negative life events, other antecedent factors do not show the expected impact on health.

The results also indicate the presence of *reversal effects*. Recent advantages seem to play a compensating role in the face of cumulative disadvantages experienced early in life and during the life course. The longer the time gap between current health and the adverse event, the greater the chance that the negative condition can be improved (e.g. a young person can catch up on early socio-economic disadvantages). Thus, it brings hope to "an excessively pessimistic determinist view of ageing" that might be suggested by cumulative disadvantage theories (Ben-Shlomo and Kuh, 2002). In the absence of chronic health conditions during youth and adulthood, later developmental phases of life might have a stronger impact in terms of positive or negative effects on health status than early years. This seems to confirm that time can compensate for up early experienced disadvantages in life and counter the effects of negative factors, and vice versa. More research is needed to draw a balance sheet over time considering that the most recent period of time might well be the most crucial after all.

In addition, some striking gender differences in the results can be underlined, although they will be developed specifically in a publication in preparation. Compared to men women accumulate marked disadvantages compared to men in early childhood that perpetuate throughout life. The existence of *gender differences between early disadvantages and current deleterious health status* leads us to look at women and men through a differential lens during their life course. Inequalities engendered early in the lives of today's older cohorts have marked effects on their current health status. It is clear therefore, that in terms of a better understanding of health inequalities among women, measures of socio-economic disadvantage over the life course are both conceptually and empirically superior to using socio-economic indicators at one point in time (Wamala et al., 2001). The identification of new factors related to gender differences such as individual developmental aspects specific to each sex could be a basis for reflection and intervention. Throughout life, the dynamics of a healthy and active ageing among men and women provide different models that bring lessons not merely in a gender-specific way but moreover in a coherent and balanced perspective from which both sexes may benefit in the future. The findings suggest that future research on the effects of cumulative advantages and disadvantages over the life course should explicitly adopt a gender perspective on the processes and pathways by which the health of men and women may be affected by similar or different factors.

From a methodological point of view, caution must be given when generalising these results. The decision to limit the study population to elderly participants in each of the first interview waves introduces a "positive bias" with regard to health, as the remaining subjects are most likely healthier than the drop-outs. As a consequence, the impact of cumulative determinants of health might be underestimated in our results. Other researchers have mentioned this selective mortality bias and suggested an intra-cohort convergence and homogeneity overtime. This would

support the hypothesis of the effects of social status on health being just opposite at higher ages (e.g. House et al., 1994; Marmot and Shipley, 1996; Robert and House, 1996). The most common explanation of this finding is mortality selection, in that at older ages the surviving population is substantially more homogenous in many measures of social status, although there is some evidence that contradicts this interpretation (Beckett, 2000). Also, causal effects and links must be viewed with care as they are all based on subjective assessments of the past, which cannot be verified objectively. Nevertheless, a subjective assessment has its value, as it has been the best predictor of functional incapacities and mortality in numerous studies (Stuckelberger, 2000).

Finally, disentangling the ways in which factors at each stage of life act or interact to shape health is, obviously, complex and difficult and needs further investigation. The fact that explanations are not only disease specific, but may also vary between cohorts, populations or regions adds to this complexity. It is crucial to understand that the effects of early life exposure on later risks of disease are likely to be highly contextualized in both time and space.

5   Conclusion

The cumulative advantage/disadvantage perspective in gerontological studies has intellectual relevance for several other established theoretical paradigms in sociology, psychology, and economics. On the basis of issues deriving from these perspectives and from the growing body of work on cumulative advantage and disadvantage, there are several promising directions for further research in gerontology.

Considering that contemporaneous socio-economic advantages can counteract past disadvantages, these processes need to be better understood in terms of time duration and exposure. More research is needed to understand the dynamics of cumulative disadvantages, advantages or both throughout the different stages of the life course. In policy terms, compensating for parental educational deficits would appear to be of considerable value for improving health promotion over the life span. Indeed, the very beneficial influence of higher education on health has been consistently evidenced in cross-national comparisons but more importantly as a health determinant for individuals of all ages (Mirowsky and Ross, 2003).

Clearly further developments and research projects are needed in fields linking "social epidemiology" (Krieger, 2001) and "life course epidemiology" (Kuh et al, 2003) and an interdisciplinary framework could be used for guiding research. Additional psychosocial risk factors (e.g. chronic and acute stressors, self-efficacy, personality traits) should be included in future research in order to account more adequately for the social differentials in health (House et al. 2001). Further, the

concept of social and psychological capital in self-reported health and a mechanism for sustaining or regaining an optimal health status should be explored.

The future success of cumulative advantage/disadvantage theory lies in its capacity to elucidate new mechanisms and disease pathways as well as its ability to explain social, environmental and temporal patterns of disease distribution in the population. Specifically, there is a need to develop a broader theoretical linkage between socio-economic and psychological conditions during the life course and health by understanding: (1) the contextual factors that help mediate the effects of social factors and health – e.g. the role of social isolation, social support and inter-generational social capital. Existing studies indicate that the more traditional health-related risk factors (e.g. smoking, drinking, and exercise) account for little of the health and mortality inequalities, and (2) the institutional- and societal-level opportunities and constraints that provide barriers to health care and health promotion, e.g. social and health policies including access to jobs, health insurance, and medical care.

Finally, findings from this study are a first step in understanding the linkages between early life course factors, recent factors and current health status in the Swiss ageing population and open a promising field for future investigation. Using the cumulative advantage/disadvantage perspective might be useful for preventing of illness and Health promoting by identifying particularly harmful constellations of cumulative disadvantages.

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Appendix: Measures of health and cumulative disadvantages

A   Self-assessed health as the dependant variable

1   General (physical) health

Question asked: *"We are going to talk about various aspects of your health. How do you feel right now?"* Possible answers range *"very well"* (score 1) to *"not well at all"* (score 5)?

Firstly, the annual scores are dichotomised in two categories of well (very well, well) and less than well (so so, average, not very well and not well at all); secondly, persons with at least three mentions of self-rated ill-health (17.5%.) for five consecutive years are considered in bad health.

2   Mental Health

Question asked: *"Do you often have negative feelings such as having the blues, being desperate, suffering from anxiety or depression? Could you give a score between 0 to 10, 0 meaning "never" and 10 "always"?*

Firstly, the answers given for the five-year period 1999–2003 have been averaged (1.8 overall mean; 1.4 for *men* and 2.1 for women); secondly, individuals with an average score above 3 points are considered to be suffering from mental health problems (20.4%).

3   Functional Health

Question asked: *"Please tell me to what extent, generally, your health is impaired in your everyday life activities (in your housework, your work or leisure activities)? Could you give a score between 0 to 10, 0 meaning "not at all" and 10 "a great deal"?*

Firstly, the answers given for the five year period 1999–2003 have been averaged (1.95 overall mean; 1.8 for men and 2.1 for women); secondly, people with scores above three points are considered to be experiencing a notable handicap in their everyday activities (18.2%).

As expected, the four health measures overlap to some extent as every single health aspect affects all the others (Pearson r correlations: $.19 \leq r \leq .69$).

Correlations between health measures 1999–2003 (Pearson r):

	Self-rated health Average score 1999–2003	Mental health Average score 1999–2003	Functional health 1999–2003
Self-rated health	1.000	0.446	0.686
Mental health	0.446	1.000	0.395
Functional ill-health	0.686	0.395	1.000

Note: All the above displayed correlations are significant at the $p \leq 0.001$ level.

B   Measuring cumulative disadvantages as independent variables

In addition to the large array of annual Swiss Household Panel data on each individual's *current living conditions*, retrospective information on youth and life course dimensions was also obtained:

I   Youth period: Disadvantages in youth
II   During the life course: major negative life events
III   Long standing health problems
IV   General characteristics
       IVa   Socio-demographic and socio-economic aspects
       IVb   Negative life events occurring 1999–2003
       IVc   Social support – 1999–2003

I   Youth period : Disadvantages in youth

– *Living with both parents or not at age 15*: 85 % of respondents indicate that they were living with both parents when they were 15 years old. Out of the 15% missing at least one of their parents during youth, 8% lived with their mother, 3% with their father and 4% with neither of their parents.
– *Financial difficulties during youth*: 39 % of respondents encountered financial difficulties during their youth;(17.7% only "at certain times" and 21.3 "nearly all the time").
– *Low socio-economic status of the parents (SES)*: 32.5 % of respondents indicated that both of their parents enjoyed education to primary level only.

With regard to the prevalence of disadvantages experienced during the youth period, there are no statistically significant differences related to gender.

II   Major events during the life course

– *Separation / divorce*: 19.5% of the respondents had experienced separation or divorce during their life course.

– *Death of husband or wife / death of partner*: Independent of their current marital status, 11.2% had been affected by widowhood or experienced the death of their partner at least once during their life course. Three times more women had experienced this than men.

– *Death of parents*: For 60% of the respondents, both parents were already dead at the time of the first interview in 1999; 19% reported one parent alive and 21% both parents alive.

III Long-standing health problems

During their first interview in 1999, 25.3% of respondents indicated that they suffered from a long-standing health problem. The question asked was: *"Are you suffering from a long-term health problem or disability of a psychological or physical nature?" (yes, no).*

The cumulative life-long impact of chronic health conditions contracted early in life or at different stages of the life course has been intensively researched and is well documented (Ferraro and Kelley-Moore, 2003; Verbrugge and Jette, 1994). The presence of such conditions leads not only to worsening health at any age but also to less favourable living conditions.

IV Recent and current situation 1999–2003 – Model A

IVa Socio-demographic and socio-economic aspects

– *Socio-economic status* (SES) comprises *household income* and *level of education*.

– The *household income* for a given year has been obtained by adding up the individual incomes of all household members if available, or alternatively by taking total household income as indicated by the reference person. As a result of refusals and incomplete information, income is missing for 4% of the households in the sub-sample of the elderly.

– The yearly estimations of the total net household income were then equalised by taking into account the number and age of all the household members, so that household income was comparable across the different types of households[5].

– An *average equalised household net income* has been computed on the basis of the five-year period 1999–2003 and categorised as quintiles of roughly equal size[6].

5   The household income is standardized in order to allow comparison of households of different sizes and compositions as if they were all composed by one fictitious person. We are using the method developed by SKOS (Schweizerische Konferenz für Sozialhilfe) which takes into account the number of adult persons and the ages of children living in the same household for dividing the total crude household income. (http://www.skos.ch)

6   The definition of the quintile income limits is based on the weighted SHP-1st wave 1999 house-

—   *Level of education* is measured by the highest level of education achieved in
      1999 and is used as an ordinal variable from lowest to highest: compulsory,
      secondary and higher education.
—   *Age* is expressed in number of years.
—   *Ethnicity* is measured by foreign as compared to Swiss nationality in 1999. In
      the A and A-B models nationality is introduced as a general control variable,
      as foreign nationals tend to indicate worse self-rated health. However, no
      special emphasis is put on the meaning of these results (Zimmermann and
      Jeangros 2004).

IVb   Health threatening life events during the period 1999–2003

To assess negative life events which may have occurred during the five year period,
eight kinds of potentially health threatening events were probed: *(1) illness, accident
(self); (2) illness, accident (close person); (3) death of close person; (4) termination of
close relationship, (5) conflicts with/among close persons; (6) problems with children;
(7) threat or attack on self, and (8) other negative life events.*

The question asked for each of the life events presented was: *"Since ['month
and year of the last interview'], have you had an illness, an accident or another serious
health problem?"*

Illness or accident and death of a close person are the most frequently cited
negative events for any given year, with about 20% reporting each of them. Over the
five-year period, one out of six subjects reported at least one illness or accident.

The "Life Event Incidence Index" represents the total number of events reported
during the period 1999–2003 in each of the consecutive five interview waves. The
average number of reported life events is 3.7. Women tend to report a statistically
significant higher number of such events (3.9) than men (3.4), suggesting an accu-
mulation of events that potentially impact health.

IVc   Social Support – 1999–2003

Practical and social support of relatives and children has been assessed by asking the
following kind of questions:

a)   *In your opinion, if needed, to what extent can your relatives or your children pro-
      vide you with practical help (this means concrete help or useful advice), 0 means
      "not at all" and 10 "a great deal"?*
b)   *If needed, to what extent can your relatives or your children be available and show
      understanding, by talking with you for example, 0 means "not at all" and 10 "a
      great deal"?*

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hold level data and is applied to the longitudinal 1999–2000 individual basis.

The following five sources of social support were probed: (1) partner or spouse; (2) own children and relatives; (3) neighbours; (4) close friends; (5)acquaintances and colleagues.

For both aspects, total support is operationalised by adding up the scores of all the five sources of support for each of the five years[7]. For any given year the minimum possible support equals 0 and the maximum possible support 50. These yearly support scores are then summed separately for *practical* and *emotional support* and each summed score divided by 5 accordingly to the number of years taken into account. The average support scores are respectively 23.9 for practical support and 27.2 for emotional support. Men report significantly higher average support from both sources. Both aspects of support are strongly inter-correlated ($r = .80$).

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7   If a relationship is absent (e.g. no spouse no partner), the degree of support is set to 0, meaning
        no support.