Happiness, Health and Well-Being in a Life Course Perspective: Quantitative Data Collection and Analysis of Sequences of Subjective Indicators

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Abstract

Subjective information has recently made a remarkable breakthrough into quantitative data collection and analysis in demography. Seen as a complement to hard statistics, the new perspective it opens seems promising. In the study of life-event histories, pioneering sociologists have developed the qualitative analysis of turning-points based on qualitative life-course narratives; we here present quantitative surveys which recorded factual individual life-event histories together with perceptions of subjective well-being, self-rated health indicators and financial situation over the life course. The interest of this approach is to explore variations in the subjective indicators along individual life courses rather than their absolute level at any point in time; and to confront facts and perceptions in order to better grasp the interpretation of social, familial, health transitions that take place along the life course. We here present how demographers collect such data and how they validate the subjective information against factual data. Some examples of the analysis of individual histories of subjective well-being are then presented and discussed.

Subjective information has recently made a remarkable breakthrough into quantitative data collection and analysis, even in that hardest of soft sciences, economics (Frey and Stutzer 2002; Ravallion and Lokshin 2002; Amiel et al. 2013). And Subjective Well Being (SWB) indicators are now well established policy-making and evaluation tools (OECD 2001 2008). Seen as a complement to hard statistics, the new perspective seems promising. Already in epidemiology, more than 30 years of research have established *self-rated health* as an important subjective indicator which provides a global assessment of an individual's health status, encompassing

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a host of dimensions that no other single health outcome is able to capture; an indicator strongly correlated with morbidity and disability (Goldberg et al. 2001; Singh-Manoux et al. 2006; Jylhä, 2009).

Such indicators are nevertheless usually measured at the time of the survey. In this paper we adopt an alternative point of view and examine subjective indicators in a dynamic perspective in the context of life course studies.

The life course approach was initially introduced into the social sciences through the field of migration (Thomas and Znaniecki 1918). And pioneering sociologists have explored perceptions based on qualitative life-course narratives to study the life course turning-points (Hareven and Masaoka 1988). Beyond the study of simple factual chronologies of events along individual life courses, this approach has a multidimensional objective, aiming to explore the links between biology, psychology and social influences on the development of individual trajectories (Elder 1994). Life course studies, with the data from quantitative life-event history surveys available in recent decades (GRAB 1999), has extended the scope of standard longitudinal analysis by drawing results from individual data analysis instead of inferring behaviours from aggregate level results (Courgeau and Lelièvre 1992). These surveys collect individual data, mostly retrospectively, by asking interviewees to reconstruct their past trajectories, thus capturing the interplay between the different spheres of people's life courses, such as family, occupation, migration histories, etc. Specific quantitative methods have been designed to analyse such data (GRAB 2009). In demography, the collection of data on motivations and the causal analysis of processes reflect a legitimate concern to understand the behaviors under analysis. In the case of life course data, the retrospective collection of life histories can easily combine the factual reconstitution of individual life-courses and information on turning points, well-being along the life course and an evaluation of financial situation and health

from childhood to the date of the interview. The interest of this approach is *(i)* to explore variations in subjective indicators along individual life courses rather than the absolute level of the measures at any point in time; *(ii)* to confront facts and perceptions in order to better grasp the interpretation of social, familial, health transitions that take place along the life course.

In this paper, we present quantitative surveys which record factual individual life-event histories together with perceptions of *subjective well-being*, *self-rated health* indicators, *financial situation* over the life course as well as turning points. Our objective is to describe how demographers collect such data and how they validate the subjective information against factual data. We then illustrate our demonstration and give some examples of the analysis of individual histories of well-being. This presentation provides an overview of already published material and work in progress.

COLLECTING SUBJECTIVE TRAJECTORIES

Our experience is mainly drawn from the analysis of quantitative retrospective life event history surveys (GRAB 2009). Information relative to respondents' family, residential, health and occupational trajectories are recorded on a *Life History Calendar* (LHC) (Figure 1a and 1b). At the end of the interview, in the light of the factual elements in the grid, respondents are invited to divide their life into different periods and to characterize these periods in relation to each other. The sets of boundaries are indicated independently by the respondents (between good years and bad years; good health versus poor health; affluence and financial hardship…) throughout their life course. This approach integrates both quantitative and qualitative approaches within a single set of research questions and a single data collection tool, in a joint reconstruction of facts and perceptions.

Retrospective Data Collection

Let us rapidly recall the fact that, because prospective surveys[1] conducted in the general population are costly, prone to selective attrition and that obtaining entire life event histories takes a whole life-time…; most quantitative demographic life course surveys are retrospective (GRAB 2009). A large volume of methodological work has focused on the reliability of the information collected retrospectively, especially in the light of possible memory biases (Poulain et al. 1991). The effects of memory are not necessarily a problem, especially where survey tools have been designed to ensure that chronological order is adhered to and event histories are consistent. Nonetheless, when respondents report a past experience, they inevitably try to make sense of the events that occurred, and this undeniably "smooths out" the life course.

Besides, the respondents retrospectively attribute a meaning to an event in relation to other experiences in their life; rendering the collection of subjective well-being histories alongside factual life course events a highly relevant and meaningful experiment.

To complete a LHC, interviewers adopt an alternative mode of questioning to standard question-and-answer interviewing, eliciting a spontaneous narration similar to that produced during the process of recall. This data collection method favours the associations and organizes life course events in relation to each other ("I was born in Chiang Mai in 2518 and moved to San Sai after my mother died when I was 12. That is when I left school", "I changed jobs a year before my arrival in the capital"). This also makes it possible to include back-and-forth adjustments over the course of the interview ("actually, my marriage happened right at the time of my dad's death, and then my mother came and lived with us"). The grid is therefore relatively easily and rapidly completed with a remarkable level of cooperation of the respondents (an hour on average for the *Biographies and entourage* survey among a sample persons aged 50-70) as has been repeatedly observed (GRAB 2010). The data processing is simplified by the fact that the grid prefigures a spreadsheet which can be keyed in line by line. It has now been used in many different contexts, in all continents, and proved efficient for surveys with varied objectives such as the study of urbanization, the impact of HIV, international migration and health, etc. (Grab 2010; Le Cœur et al. 2005; Desgrès du Loû and Lert 2017).

Methodological work on both retrospective and prospective life course data collection since the 1980s has demonstrated the reliability of the data collected with the appropriate tools, with respect to their chronological consistency and completeness (Courgeau and Lelièvre 1992: 18-26). While these studies have confirmed the presence of a subjective dimension in this reconstruction, they have also emphasized the need to capitalize on it. More precisely, the work we present relies on the interplay of quantitative and qualitative information within individual trajectories. It focuses on integrating elements of perception that are not derived from qualitative narrative.

The data analysis from two life event history surveys are presented here: the *Biographies and Entourage* survey (Bonvalet and Lelièvre 2016) and the *Living with Antiretrovirals* LIWA survey (Le Coeur et al. 2005), in order to show the potential of these data for the analysis of perceived well-being in a life course perspective in very different contexts.

The Life Event Histories and Entourage (Biographies et entourage) survey (2001)

The *Life Event Histories and Entourage* survey (2001) is a retrospective survey of 2,830 residents of the Paris region (France) born between 1930 and 1950. The sample was randomly drawn from the 1999 census to be representative of the residents of the Paris region on the basis of their age, sex and place of residence[2]. The questionnaires, which were completed during face-to-face interviews, recorded the residential, occupational, and familial milestones in the respondent's own

Year	Age	Family	L1	Residences	Detailed occupation of the respondent A2	Age	CONCLUSIONS Sy1	Sy2	Sy3	SF
1943	00		1	CLICHY		00				
1944	01					01				
1945	02					02				
1946	03					03				
1947	04					04				
1948	05					05	No contact with my			
1949	06					06	father... Very strict			
1950	07	DF	2	ST DENIS		07	stepfather, lack of		1950: Death of my	
1951	08					08	affection...		father	
1952	09					09		D		
1953	10		3	PARIS 18e		10	lonely at boarding school			3
1954	11	B1				11	and while an apprentice...			
1955	12					12				
1956	13					13				
1957	14					14				
1958	15	B2				15				
1959	16		4	PARIS 20e	APPRENTICESHIP	16				
1960	17					17				
1961	18		5	ALGERIA	ARMY & ALGERIAN	18	The way took me away...	G		
1962	19				WAR	19	and brought me new friends			
1963	20			MONTREUIL	PLUMBER	20				
1964	21		6			21				
1965	22	MA		PARIS 20e	PLUMBER - HEATING SYSTEM SPECIALIST	22	Met Ana			
1966	23	CA				23				
1967	24					24	Happy marriage and			
1968	25					25	family life			
1969	26					26				
1970	27					27				
1971	28					28				
1972	29	C2		PARIS 19e		29				
1973	30					30				2
1974	31					31				
1975	32					32				
1976	33					33				
1977	34					34		G		
1978	35					35				

Figure 1a. Abbreviated Example of Factual and Perceived Data Collection from the *Biographies and Entourage* Survey (Ined 2001)

Note: For this heating technician who has just retired, we reproduce the landmarks in his family trajectory (first column: his father's death, birth of his two brothers, marriage and the birth of his two children), along with his residential and occupational trajectory, which are aligned with his division of his life into periods in response to the following questions:

Sy1 - Can you divide your life into different periods? Characterize these periods; in particular, identifying what differentiates them from each other and what they represent in your life.

Sy2 - For each period, were these:

    VG   very good years

    G   good years

    PF   problem-free years

    D   difficult years

    VD   very difficult years

Sy3 - Are there any personal or historical events that marked your life?

SF - Household income assessment scale

1. you had to go into debts to manage
2. you were hard up
3. you managed ok, being careful
4. you lived well
5. you were affluent

Year	Age	Family life	Children	Residence	Occupation	HIV test	Symptoms	ARV	Health	Finance	Happiness	Crisis	Age
2518	0		•						•	•	•		0
2519	1												1
2520	2												2
2521	3												3
2522	4												4
2523	5			ChiangMai	•								5
2524	6												6
2525	7									Lived	Good		7
2526	8									well	years		8
2527	9				Primary School								9
2528	10												10
2529	11												11
2530	12	◉ Mdth		•	•					•	◉ DTH		12
2531	13								Good				13
2532	14												14
2533	15									Hard	Difficult		15
2534	16			SanSai	Agriculture					times	years		16
2535	17				Daily								17
2536	18	• Sp1			worker				•				18
2537	19					Test+			Difficult			◉ HIV	19
2538	20	• Sp1Dth											20

Figure 1b. Life History Calendar of the Living with HiV-Aids Survey (LIWA survey, 2007)

Note: The 3 last columns (Health, Finance and Happiness) record the respondent self-rated health, financial situation and subjective well-being. 2007 is year 2550 in the Buddhist calendar.

The Grid concerns a respondent aged 20 in 2538. The respondent lost her mother at age 12 and had to move back to Sensai, leave school and work in the rubber plantation, she was infected during her first union, but reported that her health had been bad since the age of 17. Her financial situation declined after her mother's death and overall this was also the time when her overall well-being changed from good to difficult years. Two crises are also noted: her mother's death and the disclosure of her HIV infection.

trajectory, year by year, on a Life History Calendar (Figure 1a). Finally, the respondent produced a free-form summary at the end of the interview in the light of the factual elements in the grid, in which respondents were invited to divide their life into different periods, placing the time boundaries on the same grid. The respondents characterized the periods in relation to each other. The first set of boundaries was chosen from the point of view of the respondent's well-being, another from that of the financial situation of the households that he/she belonged to over the course of his/her life (Bonvalet and Lelièvre 2016).

The Living with Antiretrovirals LIWA Survey (2007)

This project was designed to investigate the impact of antiretroviral (ARV) treatments on the lives of HIV-infected patients and more broadly of their families. The LIWA project was funded by the ANRS grant n°12 141. All patients receiving antiretroviral treatments in four community hospitals in Chiang Mai province, Northern Thailand, were interviewed in a quantitative life-event history survey conducted in November 2007. While the respondents may not be representative of the whole population of HIV-infected patients in Thailand, they are typical of the persons living with HIV-AIDS in rural or sub-urban communities of Northern Thailand who are aware of their HIV status, who need treatment and, as Thai citizens, have access to the free antiretroviral treatments under the universal-coverage health care system or other schemes. The survey collected life-event histories of 513 HIV-infected patients on antiretroviral treatment including their family, occupation, residential, financial and medical history, as well as their self-rated health throughout their life course (see Figure 1b) (Le Coeur et al. 2017).

We will first present how we analyze *subjective well-being* and *financial situation* along the life course with the data from the *Life Event Histories and Entourage* survey (section II). Then we will have a look at the

self-rated health indicator collected in the LIWA project and its variations along the life course (section III).

ANALYZING SUBJECTIVE WELL-BEING ALONG THE LIFE COURSE

The main objective of a life course analysis of the subjective well-being is to identify how it evolves from childhood to adulthood in response to changing family composition, residential mobility, etc. We will give here an overview of the different steps in the analysis of these personal histories of well-being.

Dividing One's Own Life Course into Periods

The respondents' interpretation of their own trajectory led to various strategies, notably in terms of the number of periods cited. However, very few individuals did not wish to divide their trajectory into periods at all, considering their life to be "a long quiet river." At the other extreme, fewer than 1% distinguished ten or more periods. The median number of periods was four, and two thirds of respondents mentioned between three and five (Laborde et al. 2007).

A logistic regression modeling the probability that a respondent would designate more than the mean number of periods highlighted the importance of educational capital in this interpretative exercise: individuals with a higher level of education distinguished more periods. Residential and occupational trajectories seemed to be very closely tied to the perception of the life course trajectory: the more steps they include, the greater the number of perceived periods. Results regarding family history were more nuanced: the number of children and the deaths of close family members did not have a significant effect, contrary to divorces, separations or the death of a spouse. But the lack of an effect in this model does not necessarily mean that the relevant events did not often mark a change of period since it only tests the propensity to declare more

than the mean number of periods. It could be, for example, that a very large proportion of respondents perceived the birth of a first child as a change of period, regardless of the number of periods that they distinguished.

The Tone of Trajectories

Beyond the division into periods, lies another facet of our analysis: that of the tone of the different periods identified by the respondents, and the sequence of these periods. For well-being, respondents classified each of them in response to the following question:

> **Sy2** - For each period, were these:
>   (VG) very good years,
>   (G) good years,
>   (PF) problem-free years,
>   (D) difficult years,
>   (VD) very difficult years

The initial description of the classifications of the periods between birth and an age between 50 and 70 years (depending on the respondent's age at the time of data collection) showed that the respondents evaluated the majority of periods (57%) positively (as "good" and "very good" years); that these periods represented 37 years, or two thirds of the mean duration of respondents' total trajectories (58 years); and that they were distributed with no concentration in any particular period[3]. Overall, respondents described 20% of periods as difficult and 8% as very difficult, representing a mean of 8.7 years and 3 years, respectively. The most neutral periods (problem-free years) made up 15% of the total number of periods and had a mean total duration of 9.5 years (Laborde et al. 2007).

Analyzing Individual Trajectories of Financial Comfort

Another subjective scale was used for the financial situation of the household along the life-course. The question put to the respondents was:

> **SyF** - For each period, given your household's income, do you consider that:
> 1. you were affluent
> 2. you lived well
> 3. you managed ok, being careful
> 4. you were hard up
> 5. you had to go into debts to manage

To analyze theses subjective trajectories, they were coded as sequences with one element per year, which could take the values 1 to 5 for financial situation (and VD, D, PF, G or VG for wellbeing) according to the respondents' declaration. In order to use sequences of the same length, we considered only the first 50 years of each trajectory. One way to represent the distribution is to order all sequences, showing, for each age, the distribution of values along the life course. In Figure 2, the grouping of financial comfort trajectories is clearly grounded on the tones of childhood, from affluent childhood to being in hardship. Note the very small proportion of individuals reporting poverty (1, i.e. red) at any time during the life-course.

A large majority of trajectories (78%) alternate between at least two tones, describing "highs and lows"; a very large number of combinations were produced. In order to summarize entire trajectories in their complexity without eliminating part of the corpus, we used methods of sequence analysis, which allowed us to uncover patterns in the changing perceptions of individuals over the course of their trajectories, identifying a limited number of typical trajectories (Abbott and Tsay 2000). The technique employed was Optimal Matching Analysis (OMA). It presents the advantage of jointly taking into account the different time dimensions of sequences: that is, the timing of transitions and the duration and order of steps (Robette 2011).

Optimal matching is based on measuring dissimilarities between pairs of sequences by calculating the cost of transforming one sequence into the other using three elementary operations: insertion
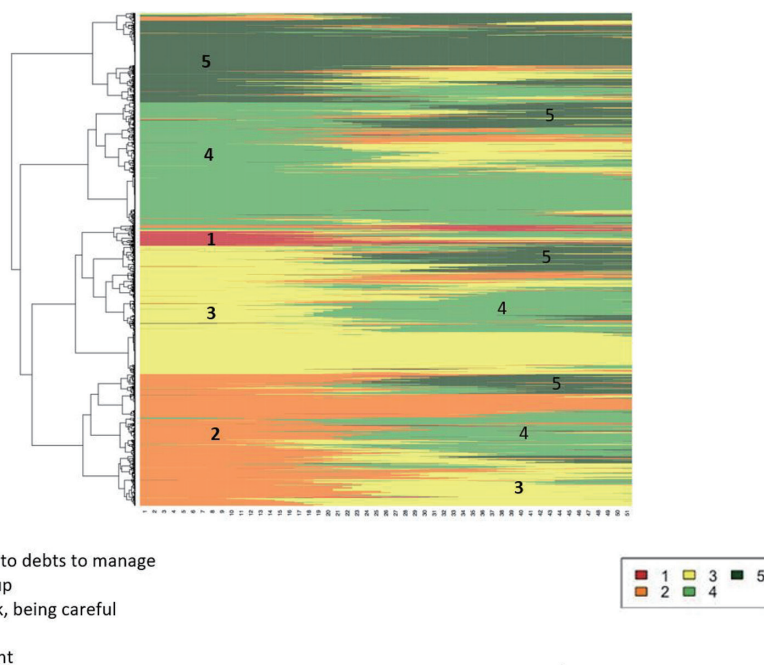
1. you had to go into debts to manage
2. you were hard up
3. you managed ok, being careful
4. you lived well
5. you were affluent

Figure 2. Classification of 2.737 Trajectories of Reported Financial Comfort
Source: INED, Biographies and entourage survey, 2001.

(one element is inserted into the sequence), deletion (one element is deleted from the sequence) and substitution (one element is replaced by another). Each operation is assigned a specific cost. The dissimilarity or distance between two sequences is equal to the minimal cost of transformation of one sequence into the other. Optimal matching of each pair of sequences in the data leads to the creation of a distance matrix which is then used as an input to perform a clustering technique and obtain a typology. We will now apply OMA to the trajectories of subjective Well-Being of the *Life Event Histories and Entourage* respondents.

Individual Trajectories of Subjective Well-Being

In order to present the description resulting from an OMA, let us examine how the *Life Event Histories and Entourage* respondents describe their life course in terms of difficult to good years. Table 1 presents the nature

and cluster distribution of a typology comprising five types of subjective well-being trajectory (Lelièvre and Robette 2015). The predominant cluster groups the globally positive trajectories (48%), followed by the trajectories which improve over time (22.5%). Then comes a cluster of trajectories classified as uniformly problem free. Then two types of difficult trajectories, albeit with reduced numbers, are identified: those where the situation deteriorated over time and those in which life was considered generally difficult (clusters 4 and 5, representing 16.7% of all perceived trajectories).

Another way to represent the clusters in the typology is through state distribution plots (Figure 3) i.e. sequences of cross sections showing, for each age, the distribution of individuals within a given cluster among the different states. This representation conceals the individual dimension of trajectories and masks the heterogeneity of the life courses that make up each type, but it offers a valuable synthesis.

Table 1. Typology of Trajectories of Subjective Well-Being Obtained with Optimal Matching

number	Profile	mainly	N	%
1	Generally happy trajectories	G	1336	47.7
2	Improving trajectories	D to G	631	22.5
3	Problem-free trajectories	PF	362	12.9
4	Deteriorating trajectories	G to D	284	10.1
5	Generally difficult trajectories	D	186	6.6
	Total		2799	100.0

Source: INED, Biographies and entourage survey, 2001.
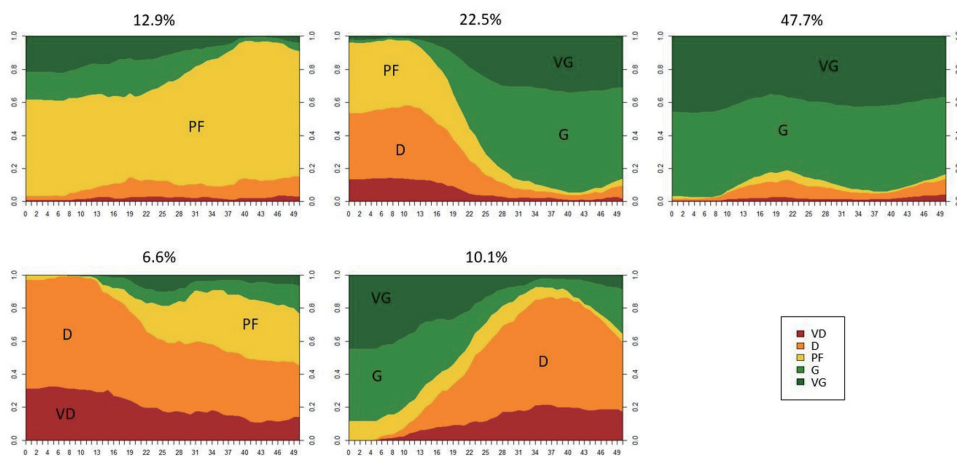
Figure 3. State Distribution Plots of the Typology of Trajectories of Subjective Well-Being
Source: INED, Biographies and entourage survey, 2001.

As a simple illustration, the analysis can then explore the characteristics of the individuals whose well-being trajectories form each cluster of the typology. The results here pertain to specific cohorts of men and women born between 1930 and 1950 and living in the Paris region in the year 2000; they cannot be generalized as they are embedded in this specific cultural and historical context. Men and women of the Biographies and entourage survey did not judge the unfolding of their lives on the same criteria, and did not face the same hardships, which is reflected in their different evaluations, although we cannot distinguish here between the relative contributions of facts and perceptions. While three-quarters of men and women perceived their trajectories as mainly happy (clusters 4 and 5), more women classified theirs as problem-free (15% vs. 11%) and fewer men considered that their circumstances had deteriorated (cluster 4: 8% vs. 12% for women). The differences between socio-occupational groups were highly significant. More than half of the self-employed and those in intermediate occupations at age 50 reported in retrospect that their well-being had been generally happy (as many as 55% among managers) *versus* only 40% of clerical and manual workers. Moreover, 11% of manual workers perceived their trajectories as difficult throughout, versus only 4% of self-employed respondents. Finally, having separated or been widowed increased the probability of reporting a difficult trajectory; the death of a parent during childhood increased the probability of declaring an improving trajectory[4].

These first explorations highlight the fact that subjective well-being trajectories are strongly structured around family, occupational and migratory events. From a methodological point of view, these results also show that combining facts and perceptions is feasible and fruitful in the framework of quantitative data collection.

SELF-RATED HEALTH, THE VALIDATION OF AN OVERALL INDICATOR IN THE CONTEXT OF HIV-AIDS

The retrospective life-event history survey collected in the LIWA project (ANRS 12 141) gathered medical information concerning not only the repondents' situation at the time of the interview but also along the entire life course, giving details about the history of their infection and medical condition, as well as migration, employment and family histories. Patients were asked how they would rate their health throughout their life course, on a "smiley" scale comprising 5 categories: very poor, poor, fair, good, very good. This rating was done at the end of the interview when the whole history of the disease and its treatment had been established. For each patient, the health indicators available from the survey include a history of symptoms, hospitalization, anthropometric characteristics and CD4 count, a robust biological marker of immune status which indicates the various stages of disease progression. In this project, we assessed the validity of the *self-rated health* indicator in the context of HIV-AIDS by matching it against the medical information available for the patients. Our first objective was to evaluate the validity of self-rated health in the particular context of HIV infection both at the time of the interview; then, retrospectively, focusing on a critical moment in the course of the disease i.e. the time of treatment initiation. Results of multivariable ordinal logistic regressions show that a better self-rated health at the time of treatment initiation is independently associated with the absence of symptoms, no
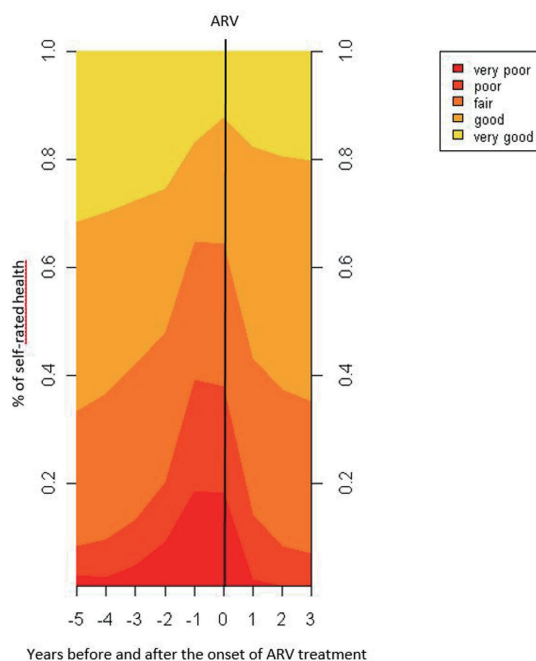

Figure 4. Self-Rated Health before and after the Onset of Antiretroviral Treatment (LIWA, 2007)
Source: LIWA survey, 2007 (ANRS 12 141)

previous hospitalization and a less advanced stage of the disease as indicated by a higher CD4 count (Le Coeur et al. 2017).

Our next objective was to identify the variation of the indicator when patients receive treatment. This time we constructed for each respondent an 8-year sequence of self-rated health declarations centered on the onset of treatment (5 years before and 3 years following the beginning of antiretroviral treatment. Figure 4 shows a synthetic description of the variation in self-rated health around the onset of treatment. At each time point the graph represents the proportion of individuals who give a particular rating. *Self-rated health* at the time of antiretroviral treatment onset is shifted toward worse health compared to 5 years previously. More than half of the participants reported poor (27%) or very poor self-rated health (29%), 23% reported it as fair and only 21% considered their health as good or very good (Figure 4). After 3 years of treatment, when all patients are under antiretroviral treatment, only a small percentage of the respondents rate their health as poor (5.5%) or very poor (0.5%), 28% as fair, and two-thirds of the respondents rate their health as good (45%) or very good (21%).

Because it is both global and easy to collect, self-rated health is widely used in surveys and in evaluation programmes. This result thus has important implications in terms of public health. Valid measurements of changes in health are indeed needed to evaluate response to treatment and to monitor treatment efficacy over time (Le Coeur et al. 2017).

PROVISIONAL CONCLUSION

In the quantitative social sciences, individual life event history data combining factual and subjective information offer new possibilities to analyse the variations in well-being, financial situation and self-rated health along the life course. Here, we have here described the data collection of two surveys conducted in very different contexts by means of Life History Calendars and given some insights

into the analysis which can then be conducted. From a methodological point of view, these data make it possible to confront facts and perceptions, and further contribute to a better interpretation of social, familial and health transitions that take place along the life course. It also provides a means to validate such subjective indicators and helps to break down the boundaries between qualitative and quantitative approaches.

Using factual reconstitutions of individual trajectories, combined with subjective evaluations, from a representative sample of Île-de-France residents aged 50-70, we analyzed the resulting set of individual trajectories of perceived well-being (Lelièvre and Robette, 2015). Then taking advantage of data collected among HIV infected patients under treatment in Northern Thailand, we described the variation of their self-rated health before and after the onset of treatment, showing a clear improvement in their health status 3 years later (Le Coeur et al., 2017).

Overall, building on the well-established existing work on well-being and self-rated health indicators measured at one point in time, the life course approach provides interesting avenues for exploring the variations of subjective indicators along individual life courses and for analyzing the varying patterns of these subjective trajectories which are strongly structured around family, occupational and medical events.

Notes

1. E.g. panel surveys and multiple-round surveys.
2. The Paris region comprises the city of Paris, the inner and outer suburbs where municipalities were selected by their socio-economic profile, and the post-war New Towns.
3. The results did not indicate, for example, a systematic pattern of idyllic childhoods.
4. These analyses were performed using the TraMineR package in R (Gabadinho et al. 2011).

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