Session Number: Session 8A Macro Indicators of Well Being
Time: Friday, August 29, PM

Paper Prepared for the 30th General Conference of
The International Association for Research in Income and Wealth

Portoroz, Slovenia, August 24-30, 2008

Measuring Quality of life – what about index construction?

Jeroen Boelhouwer

For additional information please contact:

Name	Jeroen Boelhouwer
Affiliation	The Netherlands Institute for Social Research/SCP
Full mailing address	Parnassusplein 5, 2511 VX, The Hague, The Netherlands
Email address	j.boelhouwer@scp.nl

Abstract

In the Netherlands, the Netherlands Institute for Social Research/SCP uses a composite index to describe and monitor developments in the quality of life of the Dutch population. Since 1974 this Life Situation Index (LSI) is used to measure objective aspects of individual living conditions. Every two years the results are published in a report called "The social state of the Netherlands". In constructing the index, we adopt the view that quality of life is a multi-dimensional concept. Therefore the LSI is composed of indicators from eight life domains: housing, health, leisure activity, consumer durables, sport activity, vacation, social participation and mobility. Education, income and paid employment are considered as "resources", together with the health indicator of not suffering from a long illness or handicap. These resources are not part of the index itself, but are used to describe the backgrounds of the life situation.

Non linear canonical correlation analysis is used to combine the indicators into the index. The LSI is based on micro-data, stemming from survey research. As a result of this we are able to give a summarizing insight in the different domains of the life situation at the individual level. Moreover: we can break down the index for all social groups one is interested in; not only on demographic grounds, but on economic or geographical grounds as well. Using micro-data also provides the opportunity to explore the relationship between the objective situation people are in (as measured by the index) and how they evaluate this situation.

The main goal of the paper is to discuss the chosen approach to combining the indicators. The choice of indicators is only briefly discussed, and only few results are presented (elsewhere I discussed these points in more detail, see for example Boelhouwer, 2002 or Boelhouwer and Roes, 2004). First, I'll briefly describe why we use and index and what the advantages and disadvantages of an index are (par 2) and what we mean by 'the life situation' (par 3). I also describe the framework we use for analyzing the index (par 4) and I'll briefly summarize some results (par 5). Then I'll discuss how we construct the index (par 6) and present some validity and stability tests (par 7), including whether it matters which domains and indicators are chosen (par 8). At the end I make some concluding remarks.

1. Why an index and what are the (dis) advantages?

In 1973, The Netherlands Institute for Social Research / SCP was established by Royal Decree, in which the official definition of the task is threefold. With respect to the decision to construct a composite index, the first task is the most important one, stating that SCP's task is 'to give a coherent picture of the social and cultural situation in the Netherlands and outline expected developments'.

Most of the SCP reports deal with several different aspects of society, mostly in separate chapters. Of course, this hardly can be called a coherent picture. Most of the times the summary, at the end of the report, is used to give some coherent views, trying to integrate the different chapters. But, as early as in 1974, the SCP gave form to the coherent picture in the most extreme way by combining and actually integrating the indicators into one single index for the social side of the Netherlands. There were 5 aims assigned to the study (Mootz and Konings-van der Snoek, 1990):

1 The first aim, not surprisingly, was to **depict the life situation as a single entity**: following the Royal Decree. This aim distinguishes the study from other studies where only separate domains or aspects of the life situation are taken into account. Besides, it fits in with the ways societal problems are dealt with, as these problems are more and more multi-dimensional. For example: combating social exclusion not only has a financial component, but a social one too.

2 In order to be able to tell if things are getting worse or better, we have to **evaluate this index in terms of positive and negative**. Although the concept of the life situation is in itself a neutral one (as opposed to social *exclusion* for example), we do want to distinguish deprived groups and we do want to look at trends in time. Therefore we need indicators with which we can make that distinction.

3 An important aim is to identify trends, as we want to describe developments; so we have to **create a time series** for observing changes. With this time series we can monitor developments of the life situation of social groups and analyse whether the differences between them increases or decreases. Of course the importance of a time series not only holds true for the index as a whole, but for all underlying indicators too.

4 To get some insight in the cause of changes in the life situation we have to **monitor developments in the separate indicators** over time. We have to bear in mind however, that with a global index we only get a global insight in developments and in the causes of these developments. For a real extensive analysis of the causes we might have to use other data and other sources as well.

5 We not only take into account changes in the separate indicators, but we use other information as well. Therefore we want to **situate the index in a broader context** of background information.

So we choose to construct a composite index to monitor the developments of the life situation in the Netherlands in order to meet the governmental desire of having a coherent picture of the social and cultural situation in the Netherlands. But what are actually the advantages and disadvantages of a composite index? Let's start with the advantages.

Advantages of using indices

The economist Drewnowski (founding father of one of the first social indices -the *level of living index*) stated that a social index was necessary because only by combining social indicators it is possible that they become as important as economic indices (Drewnowski, 1974). Though nicely put, this of course is a hard to reach goal and not self-evident, as the history of social indicators shows.

There are, however, other advantages of indices. One of the most important ones is that an index gives an integrative description of complex phenomena, like living conditions, social cohesion, social exclusion or indeed the life situation. The advantage of one index over different indicators is that an index gives a clear and summarizing insight in the phenomenon, i.c. the life situation. At a single glance it is clear whether the situation is improving or getting worse. This is particularly beneficial when there are splits-images of one positive and two negative indicators, leaving open the question what this means: is the situation overall good or bad (Hagerty en Land, 2007, Fahey et al, 2003; Nardo et al, 2005; Drewnowski, 1974; Booysen, 2002)? Related to this point is the advantage that indices can give insight in compensating effects between domains: a good score on one domain (like housing) might compensate a bad score on another (like health).

Another important feature of indices is that they have a communicative function. One figure is easier to communicate than ten different figures. Indices not only draw attention of the ones they are constructed for (in our case policy makers), but also of the press and the broader public (Fahey et al, 2003; Nardo et al, 2005). A nice metaphor was used by the presentation of the *Human Development Index.* In this metaphor, an index is the front door of a house. "If the human development accounting is a house, then the HDI is the door. Do not mistake the door to be the house and please don't stop at the door, enter the house."

By means of the communicative function a composite index can play a role in societal debates. We have to bear in mind though that a composite index can not always give the desired insights when analysing and explaining developments. In a lot of cases, we need more information than the index can give. For example, we have to break up the index in its domains or in its indicators. Sometimes even this is not enough and we have to look at other sources (Boelhouwer 2002a; see also Land, 2004). Moreover: a general index is not suitable to give answers to *specific* policy questions nor to evaluate *specific* policy as it particularly has a descriptive and indicative function. A general index can, however, give a global impression of (social) developments in society and, with that, of the whole of policy efforts (see also Nardo et al, 2005). The index is in this way used as an outcome measure: an improved life situation is interpreted as the result of effective social policies. However, we have to be careful using the index in this sense, as the causal mechanisms behind social and societal developments are hard to grasp (Boelhouwer, 2002). In this way the metaphor of a thermometer can be used: we can see how warm the patient (i.c. society) is, how the temperature is developing and conclude from this whether or not we have to do with the fever. When we conclude that the patient has

the fever, the thermometer can not help us any further, i.c. in finding the cause (is it a virus or a bacterium?). To find the cause, other analysis are needed. But now at least we know where to start.

The last advantage of composite indices is a methodological one: the reliability of the measurement increases as measurement-errors of separate indicators are averaged out (Batista-Foguet et al, 2004). Besides it is easier to compare and analyze the information, as the data is reduced (Booysen, 2002; Noll, 2002b).

Disadvantages of using indices

Despite these advantages there is, however, no agreement on using indices. Some oppose, and the main objections can be summarized with "there is a lack of consensus" (Noll 2002c; Drewnowksi, 1974; Booysen, 2002; Hagerty en Land, 2007; Diener, 1995). This indeed holds true for three important steps to undertake in the process of index-construction; there is lack on consensus on:

- the choice of indicators (it is unclear on what grounds indicators have to be chosen)
- the way to combine them (can we compare apples and oranges? What about pears?)
- weighting the indicators (how to reach the weight?)

Against the view that an index allows us to measure hard to grasps concepts is the criticism that a composite index oversimplifies the complexity of concepts and of society. Besides, critics say, it is unclear how we must interpret both index-scores and developments of the index. What does an increase or decrease of the index tell us about the development of the separate domains? What does it mean that one country scores 0.980 on the Human Development Index and another country scores 0.985 (see also Booysen, 2002)?

A last point of criticism is that in a lot of cases the procedure to combine the indicators into one index is unclear and not transparent. Therefore, critics say, only separate indicators can be used meaningfully. Some critics even go so far as to say that it is enough to use income.

The advantages are greater than the disadvantages

For a couple of reasons we choose to opt for a composite index for the life situation. In the first place because of the communicational value of an index as opposed to separate indicators. Another reason is that providing insight into complex conceptions, like the life situation, is easier with an index than with separate indicators. The concept 'life situation', although it is complex and multi-dimensional, is used by policymakers and in societal debates as one notion which makes it useful to depict the notion as a whole. Moreover: a composite index has extra value as analyzing tool as cumulation effects become apparent. These effects are relevant for policymakers as they show the degree and seriousness of deprivation, which is much harder to show with separate indicators.

These advantages are big enough for not giving up constructing social indices, though it is true that there is a lack of consensus on important steps to undertake. The lack of consensus is no reason to reject indices: there are enough ways to construct an index.

This however, does not mean that we don't use separate indicators at all. For a thorough analysis of developments it is necessary to examine the separate domains and indicators of the life situation and sometimes even to use other information and other sources. Therefore we not only want to follow indicators over time too, but want to situate the index in a broader context of background information.

2. What is the life situation?

So we think the advantages are greater than the disadvantages: we **do** want to know something about the progress of society and of the population in a comprehensive way. Of course, there already is a comprehensive measure that is about the progress of societies. One that is widely used: GNP. Why do we not use GNP for our purposes? Because the intended index has to measure more than economic well-being, as, in the words of Robert Kennedy in 1968: "The gross national product includes special locks for our doors and jails for the people who break them. GNP grows with the production of napalm, and missiles and nuclear warheads... But it does not allow for the health of our families, the

quality of their education, or the joy of their play. It measures everything, in short, except that which makes life worthwhile." And even though the correlation between wealth and social indicators is high, they are not the same. Each of them gives us information that the other one does not (Diener and Suh, 1997).

The social index we were looking for had to be about the life situation. But what do we mean by that concept; which domains and indicators to include? An important step in the process of index-construction is to decide what to include in the concept one wants to measure; in our case the life situation. Unfortunately there is no good and widely accepted definition. Moreover, there are a lot of closely related concepts, like quality of life, level of living and social inclusion; all of them defined in numerous ways, but lacking a widely accepted definition (Rapley, 2003, Noll 2002a).

Though there is no agreement on the definition, is not to say that there is no agreement *at all* when it comes to operationalising the various concepts. For instance: there is agreement to the multi-dimensional character of the concepts and to the fact that economic indicators are not enough to tell how well (citizens in) countries are doing (Rapley, 2003, Hagerty et al, 2001).

Another commonly noticed point of dispute is the distinction between 'objective' and 'subjective' indicators. Nowadays the contrast between the two viewpoints is not as sharp as it was. It is more and more accepted that we need the actual situation people are in and how they feel about it both (Noll, 2002a). The only real remaining dispute is where to put the focus on.

Comparative research on numerous concepts, indices and monitoring systems has led to the conclusion that for the choice of domains it even does not matter whether one chooses to focus on subjective or on objective indicators. In either case ususally 7 to 10 domains are being used to describe quality of life (Hagerty et al, 2001):

1. social networks;
2. education;
3. work;
4. housing;
5. personal safety
6. leisure;
7. health;
8. participation;
9. material wellbeing / living standard;
10. environment

The similarity in the choice of domains has not really changed since the 1970's, as Sten Johansson noticed at that time, at the start of the 'social indicators movement': "I was very intrigued by the fact that "my" list was very similar to the lists developed in other countries even if the political system and the cultures were very different. […] I think that the lists also reveal a high degree of universalism in what is considered as social concerns in all countries" (Johansson, 2002, 26).

The choice of domains at the start of the Dutch Life Situation Index in 1974 was to a great extent based on discussions led by the OECD, which resulted in a list of 'social concerns' (OECD, 1973). The point of departure for these concerns, and thus for the choice of domains for the life situation index, was that they had to be relevant for government policy and had to be focused on ends instead of on means. Besides, the choice of domains was based on what was known from the literature and to some extent the choice was pragmatic and based on plausibility and face validity. That is: the domains have to be related to each other and to the central concept; they have to be related to the life situation. However, the choice of domains is by no means final: when society or policy are changing, the instrument for studying developments within them has to change too. In the past 30 years the choice of domains and indicators has changed somewhat, but always with a sharp eye on preserving the comparability over time as much as possible (see Boelhouwer and Stoop, 1999 for an overview of changes).

Nowadays the life situation index covers a number of domains which can be categorized in three main blocks:

1. **health**:
    a. health
    b. sport activities;
2. **social participation**:
    a. loneliness,
    b. volunteer work,
    c. membership of organisations,
    d. cultural leisure activities;
3. **prosperity**:
    a. housing,
    b. mobility,
    c. holidays
    d. the possesion of assets

A next step is to decide what indicators to choose within these domains. In the history of social indicators we can distinguish points of discussion that repeatedly emerge (good overviews are given in Berger-Schmitt and Jankowitsch, 1999; Noll 2002a; Rapley, 2003; Hagerty et al., 2001; Sharpe and Smith, 2005; Diener and Suh, 1997; OECD, 1982). These points of discussion are the basis for four basic requirements for the indicators we choose (see also Boelhouwer, 2002). First, it is important that we want indicators that are capable of showing us disadvantaged groups. We need indicators that can distinguish between good and bad, that tell us whether group A is better off than group B. Next, the indicators have to be focussed on output, and be of descriptive nature instead of evaluative. The third requirement is that they have to be general in nature as we are not interested in the life situation of specific social groups or regions. Finally the indicators have to be measured at the individual level. It is important that we use one survey containing all the necessary question for the life situation index. Only in that way it is possible to grasp the correlations we are interested in: are there cumulations of deprivation? When groups fall behind or do not profit for a longer period, it is possible that new policies have to be considered. See Appendix 1 for a complete list of all indicators.

3. Framework

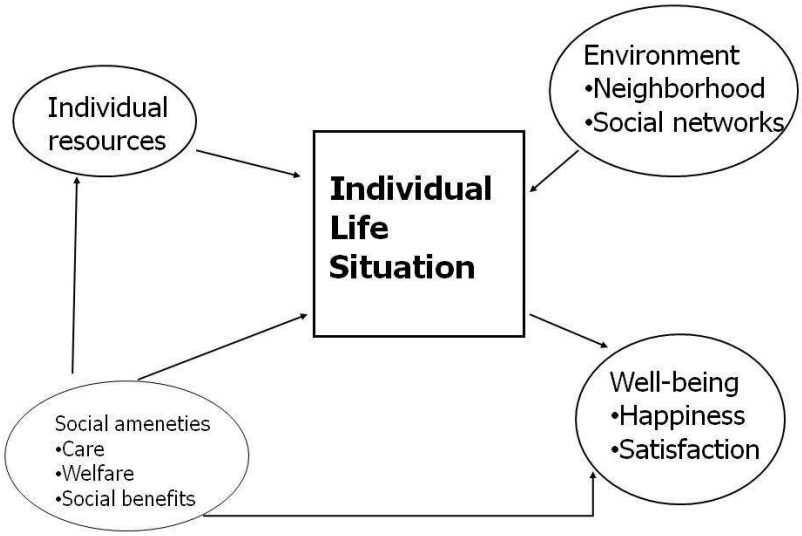
As said, we situate the index in a broader context of background information. For analyzing the results we use the conceptual framework, which is shown in Figure 1. This framework is centered around the life situation of the individual, as measured by the life situation index.

As you might have noticed, we don't include income, education and work in the index. These, we look at as resources which can be used for realizing good living conditions. The model is based on a causal relationship between resources and the life situation: the more resources at a person's disposal, the greater the chance of a good life situation. The government, trying to create as much equal opportunities as possible, exercises influence over the availability of such resources. It redistributes income and helps citizens to acquire social resources through public provision. The government therefore plays a supporting role in helping prevent social disadvantage. Where the social process and personal choices according to the norms of the community result in disadvantage, the government will compensate for this as far as possible. This is shown in the 'social amenities' part of the model at the left corner.

The physical and especially the social environments are also important conditions for the life situation of the individual citizen. Therefore we look at a number of physical characteristics of the residential environment and the correlations between the physical quality and social characteristics, such as crime and population structure. We also look more deeply at the social networks people are in.

Something different from the *actual situation* in which people find themselves is the way that people *rate* their living conditions and the extent to which people are more or less happy. In our reports we also look at the relation between the life situation, happiness and satisfaction.

Figure 1: conceptual framework for analyzing the life situation



The results of the LSI are published bi-annually in the *Social State of the Netherlands*. This report describes the life situation and quality of life of the Dutch population. Every two years the SCP seeks to describe and analyze living conditions systematically, with the above described model as starting point (for an introduction to the report see Boelhouwer and Roes, 2004). A series of fields is covered in separate chapters, namely income, employment, education, health, leisure activities, participation, mobility, crime and safety and housing. The domain-crossing life situation index is described in a chapter which gives an integrative view on the life situation.

The report is covered widely in the media and is used for educational purposes at universities. Besides, but by no means less important, the results are used by policymakers and politicians for evaluating and improving policy.

4. Some results

Before discussing the way in which we construct the index, I'll present some results: how did the life situation in the Netherlands develop since 1974? Figure 2 gives an overview which shows that overall the life situation improved between 1974 till 2006.[1] With the index we cannot only look at developments of the life situation in the Netherlands as a whole, the index can also help us keeping track of groups in society, thus showing which groups are deprived and how their life situation develops. For all social groups in the Netherlands the life situation has improved in the last 30 years (see Figure 2 for a selection of groups).

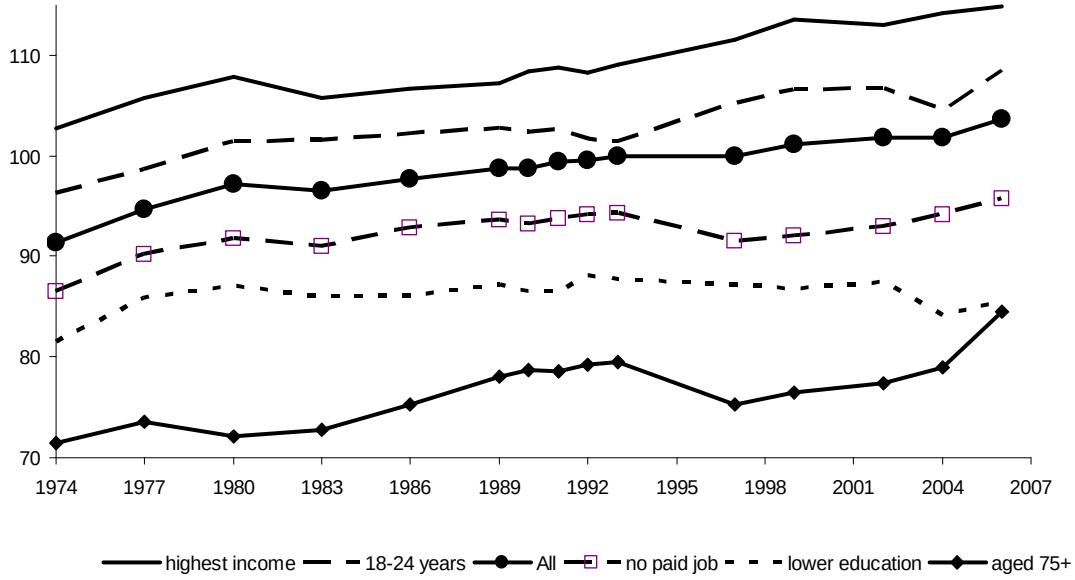
From 1997 to 2002 the life situation improved more than average for deprived groups which before stayed behind, like the elderly and people who have a lower education level. As a result of the economic recession in the Netherlands between 2000 and 2004, their life situation got worse in 2004. In 2006 however, all groups are better off again.

However, we have to bear in mind that the LSI can only be interpreted in a *relative* sense. For example: the elderly have traditionally a bad life situation compared to other age groups. By itself this

[1] Between 1974 and 2006 two major breaks in the trend have appeared. One in 1997 and one in 2004. This was unfortunate but inevitable. At both moments changes were made in the way the data was collected (in 1997 the specific life situation survey became part of a much broader survey; in 2004 the interview mode changed from 'face to face' to 'self completion'). In order to present the trend from 1974 to 2006, the index for 'all' is kept constant in these years (no progress or decline compared with the previous measurement moment is computed), thus making it possible to continue the trend of social groups, as their score is relative to the overall score.

is a not very worrying insight, for –on the average- their houses are smaller, and they are less able to sport and participate in non-domestic entertainment activities than younger people. The situation becomes alarming if their life situation declines, or even worse, keeps declining over a longer period of time (which by the way is not the case).

Figure 2: development of the life situation in the Netherlands and for some selected social groups (1974-2006)



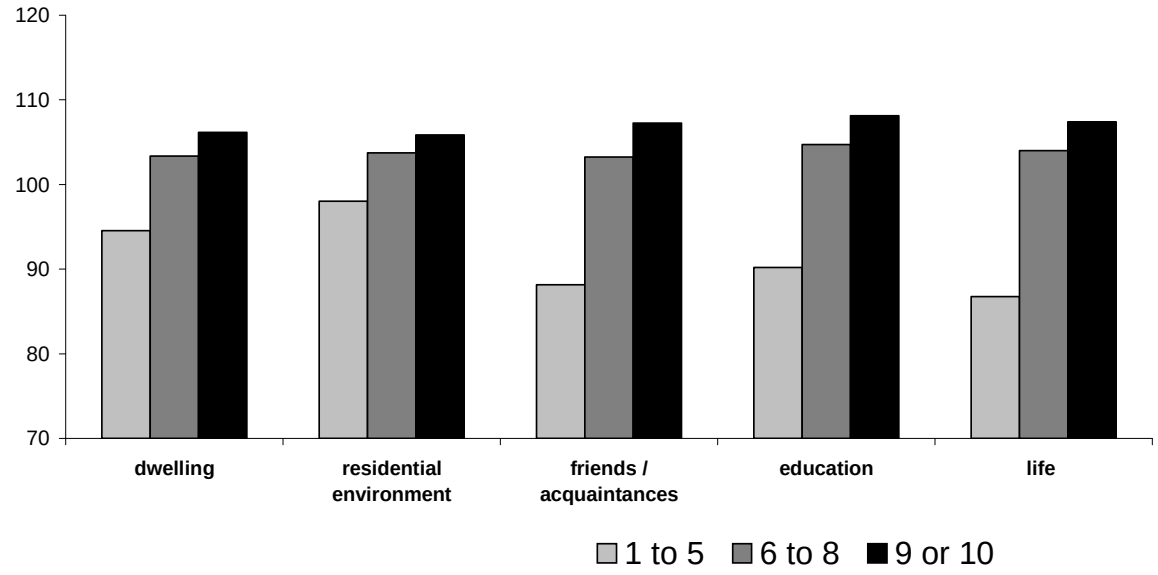
As said, a causal relationship between resources and the life situation is posited. Multivariate analysis reveals this holds true: having a high level of education, a paid job and a good income causes a better life situation (see table 1). Age also plays an important role in the level of life situation. The shown individual background characteristics together explain for about 55 % of the variance in the life situation.

Table 1: Influence of Resources and other Background Characteristics on the Life Sitution, 1974-2006 (Anova-analysis, β-Coefficients)

	1974	1980	1986	1993	1999	2006
Age	0,25	0,27	0,25	0,20	0.26	0.21
Income	0,27	0,23	0,23	0,24	0.32	0.37
(Un)Employed	0,03	0,02	0,00	0,05	0.10	0.06
Education	0,21	0,22	0,26	0,21	0.27	0.24
Household Composition	0,14	0,24	0,21	0,25	0.09	0.08
Source of Income	0,11	0,07	0,12	0,10	0.06	0.12
Health						0.19
Explained Variance	45%	48%	48%	47%	57 %	54 %

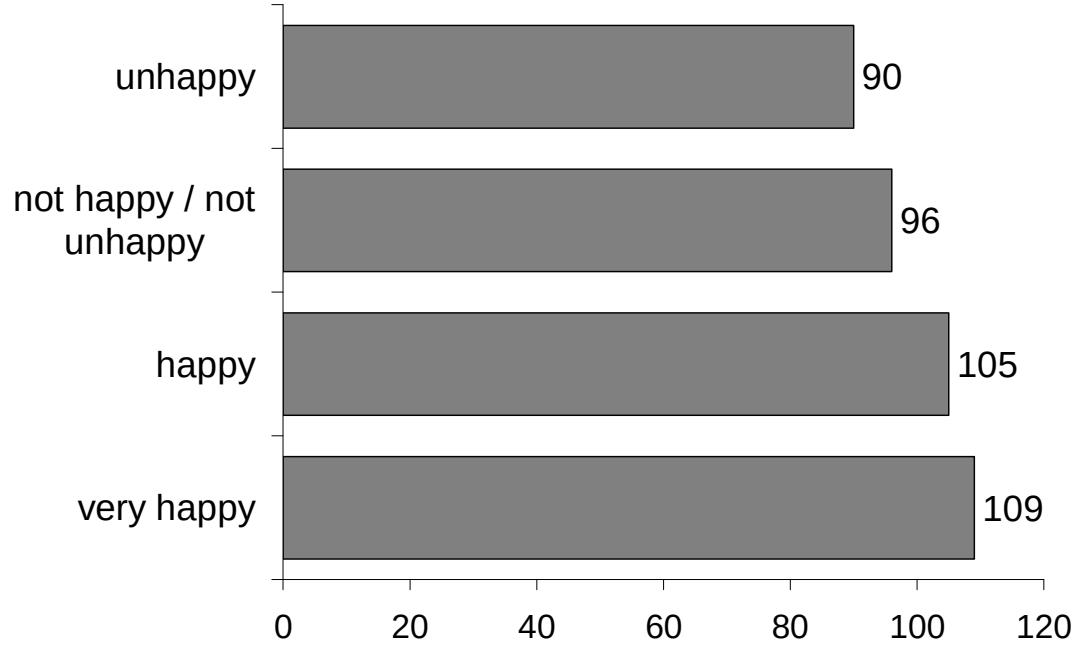
As said, we confront the objective situation as measured by the index, with subjective satisfaction. We find a positive correlation between them: a good life situation goes together with satisfied people, whether it is on domains like the dwelling, the residential environment, friends, education or on life as a whole (see Figure 3; the Pearson coefficients are respectively .18; .14; .26; .32; and .32).

Figure 3: the relation between the life situation and satisfaction with life and satisfaction with parts of the life situation (report marks, ranging from 1 worst to 10 best; 2006)



The positive correlation between the (objective) life situation and the (subjective) evaluation of life also becomes clear when looking at the relationship between the index and happiness (see figure 4).

Figure 4: the relation between the life situation and happiness (2006)



Other research shows that high correlations between subjective and objective indicators are uncommon, due to a number of reasons. One of the most important ones is that people tend to adapt to their situation (see for example Diener en Suh, 1997; Layard, 2005). Though in our case too the correlation is not very high (correlation coefficient of around .30), the correlation between the index as a whole and happiness is larger than between happiness and the indicators separately. So, by combining the indicators into one index also brings us closer to happiness (see table 2)

Table 2 Correlation of happiness with the life situation index and its indicators (pearsons coefficients, 2006)

	happiness
liffe situation index	0,31
type of housing	n.s.
size of living room	0,12
number of rooms	0,13
house owner/renter	0,17
diversity of hobby activities	0,08
diversity of cultural leisure time	0,16
diversity of membership	0,10
diversity of volunteer work	n.s.
scale for social isolation	0,36
number of times sporting a week	0,12
diversity of sports	0,12
Holiday	0,24
Holiday abroad	0,24
conumer durables (house)	0,13
consumer durables (hobby)	0,12
public transport tickets	n.s.
car ownership	0,15
hampered at activities at home	0,24
hampered at activities in leisure time	0,13

Source: SCP (CV '06)

In the previous part of the paper I discussed the choice of domains and indicators and it became clear that we wanted to use an composite index for describing and analyzing the life situation as a whole. In the next part of the paper I'll discuss the construction of the index and present some tests on validity and stability.

5. Constructing the Life Situation Index: a statistical procedure

Once we've chosen the domains and indicators we want to use, the next step is to construct the composite index. There are various ways to construct an integrative index from the various indicators (see for an extended overview Noll 2002c, Booysen 2002 or Nardo et al, 2005). Firstly, in the most simple way, an index can be constructed just by adding up the indicators. This method is easy to use and easy to understand. When using aggregated data, for instance percentages, a similar option is available, as (changes in) percentages can simply be added up. This method is used for example with the *Child Wellbeing Index* (Land 2004). This approach can be adjusted in case of different measurement units by using *z-transformations*: standardizing the different indicators, after which they can be added. Examples using these methods are the *Environmental Sustainability Index* (Esty et al, 2005) and the *Index on Social Progress* (Estes, 1988).

Another possibility is using thresholds. If, for example, a policy goal is that 80% of the people sport, but in year x this percentage is 65, sport will score 0,81 in that year. The choice of a threshold value is a normative choice. For instance: is it important to reach a maximal result (higher education) or a minimal result (at least primary education)? Thresholds are used for constructing the HDI, for example (UNDP, 1990). The advantage of using thresholds is that it is clearly defined when someone's situation is bad and when the situation is good. When adding indicators in constructing a composite index, this procedure might look easier than it is. After all: it is still hard to decide how many 'bad scoring indicators' are needed for the situation as a whole to be called bad. These are normative choices and potentially subject to debate. Thresholds are mostly used when the concept

involved has a clear meaning in terms of 'good' and 'bad', as is the case with social exclusion or safety. These concepts have natural counterparts (social inclusion and unsafety), which is not the case with neutral concepts, like the life situation. Therefore we do not choose to use thresholds. That is not to say there are no normative elements in constructing the life situation index: the whole process of choosing domains and indicators is normative. But even more: one of the requirements for the indicators was that they had to distinguish between good and bad. So we include the notion that, for example, sporting is good and not sporting is bad. We don't, however, include a threshold stating sporting at least 2 times a week is good, less is bad.

The above described options for adding indicators are considered as options without weighting. However: strictly speaking weights are *always* applied. Even when explicit weighing is lacking, implicitly every indicator has the same weight. The question therefore is not so much whether weighting is necessary, but whether one indicator has to be more important for the index than an other.

When constructing the life situation index, we opted for different weights. Using different weights offers the possibility to provide insight into the different importance of the indicators: why should type of dwelling be equally important as sporting? On top of that: we want to know whether living in a single-family dwelling is equally important as sporting 3 times a week. Moreover: the difference between sporting once a week and twice a week is not necessary the same difference as between sporting twice a week and 3 times a week (it might even be so that the only 'real' difference is between sporting and not sporting).[2]

Another problem with using equal weights, and simply adding up indicators, is the unclear order of nominal indicators. Sporting twice a week is more frequent than sporting once a week and less than 3 times a week. But what about type of dwelling? Is living in a single-family dwelling better than living in a detached house?

After deciding to opt for different weights, we had to decide how these weights should be determined. Again there are a couple of possibilities, like starting from preferences. For instance as laid down in policies: quantified goals can be used for the weighting scheme (Drewnowski 1974). However, mostly only few goals are usefully quantified.

Another possibility is consulting 'experts' to decide what the weights should be. Research shows however that consulting experts leads to almost equal weights amongst the indicators (Esty et al, 2005). We could also ask the population as a whole and determine the weights on the attached importance of the population. Several studies have shown that there is only a small relation between the importance people attach to aspects of quality of life and how satisfied they are with the same aspects (Russell et al, 2006). The study of Russell (2006) also shows that what people value as important makes much less difference as where they are satisfied with, and that it makes almost no difference whether equal weights or different weights are used. This is supported by another study: "Agreement is maximized by using the average weights from a survey of individuals' importances. Alternatively, if no surveys exist, equal-weighting of indicators is the minimax estimator that minimizes disagreement even among diametrically opposed individuals" (Hagerty en Land, 2007).

A problem with consulting experts or the population is that it gets harder to decide what is more important when the level of detail increases. This is hard when looking at indicator-level, let alone when categories have to be weighted against each other: is living in a flat less important than sporting once a week? And, if so: *how much* better it is, seems an impossible question to answer.

[2] Evans en Kelley (2004) show dat the difference between answers on a question about satisfaction with life is unequal. The difference between categories indicating satisfaction are much smaller that the differences between categories indicating dissatisfaction.

Another option is using an external, but somehow related indicator, like happiness in our case.[3] The relative importance each indicator has in explaining happiness then constitute its weight. When using objective indicators for an index (as we do in the case of the life situation index), a disadvantage of this method is that only a small part of happiness is explained by objective indicators. We already saw the correlation between the life situation index and happiness is only modest. When we go a step further, and actually try to explain happiness with the life situation index, we are able to explain only 4% of the variation of happiness (see table 3). If we add the resources and some background variables, we can raise this to 11%: age, household composition and labour market position are important for happiness too.

So the life situation is of some importance for happiness, even when other descriptive indicators are taken into account. Still, we see that these indicators are of relative small importance. This is found in other research too: the relationship between objective and subjective indicators is only small (Diener en Suh 1997; Hagerty et al. 2001). We can more than double the percentage explained variance when we include other subjective indicators in our analysis. Doing so, raises the percentage of explained variance to 24%, and at the same time the influence of the life situation gets smaller (beta of .01; see table 3). We know of other research that still other indicators are of major importance for the happiness of people, like individual qualities (for example a positive self-image) and comparison with others (Veenhoven 2002; Layard 2005)

Table 3: Happiness explained by the life situation index, background factors and satisfaction (beta's uit ANOVA analysis, 2006)

	model 1: life situation only	model 2: life situation and background factors	model 3: life situation and satisfactions	model 4: life situation, background factors and satisfaction
life situation index (3 groups: worst, middle, best)	.19	.17	.04	.01
sexe (men, women)		n.s.		-
education (5 groups)		n.s.		-
labour market positoin (no job, job for <12 hrs; job for >12 hrs)		.18		.11
age (7groups)		.14		.09
city (4 biggest cities, 21 bigger cities, elsewhere)		n.s.		-
Household composition (5 groups)		.16		.14
etnicitity (autochtonic,non-western immigrant; western immigrant)		n.s.		-
income (deciles)		n.s.		-
subjective health (5 groups)			.21	.20
satisfaction with huosing*			.06	.04
satisfaction with living environment*			.04	-
satisfaction with friends*			.15	.16
satisfaction with position in society*			.18	.18
satisfaction with education*			.04	-
satisfaction with own financial means*			.06	.05
satisfaction with Dutch society*			.07	.07
satisfaction with government*			n.s.	-
variance explained	4%	11%	22%	24%

* Satisfaction in 3 groups: grades 1-5 ; grades 6-7 and grades 8-10.
n.s.=not significant ; -=not included; empty=not included

[3] This was suggested in the overview study of Hagerty et al, which compared 21 indices and monitoring systems: "They assign components unequal weights in computing LCI by factoring the components and using the loadings on the first factor as weights. This could be improved by using the weights from a multiple regression in predicting happiness. The resulting weights would make LCI the best forecast of subjective happiness." (Hagerty et al, 2001, pp62-63).

A last possibility to get different weights is using multivariate methods. These techniques "represent an empirical and relatively more objective option for weight selection" (Booysen 2002, p128). The basis is the assumption that the indicators have a common base which has to be found . The degree to which the indicators correlate with this latent dimension determines the weights.

This option was also chosen for the construction of the life situation index. Lacking a widely accepted solution for the problem of weighting, in our view this is the best (pragmatic) solution. So we opted for a statistical way of constructing the Life Situation Index and let the statistical program weight the indicators. The starting point of the index construction method we choose is the common dimension of indicators. Instead of using a measured variable to get the weights we try to find an underlying, latent variable.

We nowadays use OVERALS, which is non-linear canonical correlation analysis, that has the advantage of the possibility to define clusters not only in theory, but in the analysis as well (Van der Burg, De Leeuw & Dijksterhuis, 1994). Within the analysis it is possible to put the number of sports in the same cluster (domain) as the frequency of sporting; and to put type of dwelling, house ownership, number of rooms and area of living in another cluster. Besides: all clusters are equally important; thus preventing a cluster with more indicators to be more important than a cluster with fewer indicators.[4]

Other advantages are that this procedure gives weights not only for indicators, but for categories too. Besides, even nominal indicators can be used. [5] In short, this analysis -which is a variation on principal component analysis- calculates the weights so as to maximise the sum of the item-total correlations.[6]

As said, we are looking for the common (latent) dimension of the indicators. For this common dimension we use the first dimension of the OVERALS analysis. In practice, this first dimension is suitable for describing the life situation.[7] The scores on this dimension have a mean of 0 and a standard deviation of 1. From 1997 onwards we present the index as a 'real' index figure, meaning that the mean life situation score for the Netherlands is put at 100 in 1997.

Some of the most important outcomes of the OVERALS procedure are presented in table 4. The 'fit per set' shows us which domains are more important and which are less important. It appears that the domain 'leisure time' is the most important one for the life situation index. Health is the least important one. It is important to recapture one of the basic principles of the life situation index: it is not about satisfaction. So, health being the least important one does not mean that people rate health as unimportant. It means that the health-indicators we use have the least correlation with the other indicators.

As for the indicators: car ownership and diversity of cultural leisure activities have the highest weight, and diversity of hobby activities has the lowest weight (weights are comparable to regression coefficients and indicate the contribution of the indicator to the dimension). Looking at the component

[4] With other techniques, like factor analysis, the four indicators for housing (for example) get greater weights than the two indicators for sporting. Although the domains are equally weighted, the indicators and categories are not: "Analogously to the situation in multiple regression and canonical correlation analysis, OVERALS focuses on the relationships between sets; any particular variable contributes to the results only inasmuch as it provides information that is independent of the other variables in the same set" (SPSS 2001).

[5] Categories of nominal indicators are rescaled in a way that leads to maximal correlation with the other indicators.

[6] More precisely: "The goal is to explain as much as possible of the variance in the relationships among two sets of numerical variables in a low dimensional space. Initially, the variables in each set are linearly combined such that the linear combinations have a maximum correlation. Given these combinations, subsequent linear combinations are determined that are uncorrelated with the previous combinations and that have the largest correlation possible. The optimal scaling approach expands the standard analysis in three crucial ways. First, OVERALS allows more than two sets of variables. Second, variables can be scaled as either nominal, ordinal, or numerical. As a result, nonlinear relationships between variables can be analyzed." (SPSS 1999, p37).

[7] The analysis can give more than 1 dimension. We use the first one because this dimension fulfils the hypotheses we have for the direction of the indicators (ie: sporting is positive, not sporting negative). We can check this by looking at the category quantifications.

loadings (which are comparable to the Pearsons correlation coefficients, and thus can be used to interpret the dimension) we see that diversity of cultural leisure activities has the highest loadings and possession of public transport tickets the lowest.

Finally the *eigenvalue* (which gives an indication about how much of the relation between the dimensions is shown by the index.) is 0.39.

Table 4: OVERALS results for the life situation index, 2006

		fit per set
Housing		0,48
Leisure time		0,52
Social participation		0,34
Sport		0,33
Holiday		0,44
Consumer durables		0,43
Mobility		0,32
Health		0,24
	weights	**component loadings**
type of housing	0,25	.26
size of living room	0,23	.40
number of rooms	0,20	.42
house owner/renter	0,35	.51
diversity of hobby activities	0,12	.30
diversity of cultural leisure activities	0,54	.66
diversity of membership	0,31	.51
diversity of volunteer work	0,32	.35
scale for social isolation	0,36	.38
number of times sporting a week	0,34	.58
diversity of sports	0,26	.57
Holiday	0,52	.67
Holiday abroad	0,23	.57
conumer durables (house)	0,33	.51
consumer durables (hobby)	0,51	.63
public transport tickets	0,22	.11
car ownership	0,58	.54
hampered at activities at home	0,37	.47
hampered at activities in leisure time	0,18	.40
EIGENVALUE	0,39	

The question is whether we need such a statistical technique, as one major problem is that it is hard to explain. Moreover: a lot of studies show that unequal weighting has little or no impact on the results. However, there are also studies that *do* find differences between using equal or unequal weights. Like the study on quality of life in American Cities where it was found that, depending on the weights given to the variables, there were 134 different cities that could be rated first and 150 different cities that could be rated last. Indeed, there were 59 cities that could be rated *either* first or last, depending on the differential weighting of the very same variables (Diener en Suh, 1997). But still, most of the studies find that weighting has little to no effect: “it has been shown mathematically that the Pearson correlation between the equally weighted and differentially weighted composite scale scores approaches 1.0” (Russell et al, 2006, p142, compare Esty et al, 2005 and Booysen, 2002).

With the Dutch life situation index we did some tests to see whether unequal weights are really important and whether it makes any difference which weights are used. I'll describe some of the major results in the next paragraph.

6. Testing the Life Situation Index: stability and validity

In a first test we did not test different weighting schemes, but different sets of data. In this test of stability, instead of the whole dataset we analysed a number of subsets, like seven sets of different age groups, men and women, different household compositions, and so on (see table 5). This is to test whether the index really is useful for all groups in society. The analysis shows that this is the case: the correlations between the subset-indices and the 'index for all' are very high (in most cases above .97). The only examples with some lower correlations are subsets with the least number of cases (18-24 years old). Note that for a real proper analysis we have to check whether the structure of the indices is the same too. That is: are the weights of the indicators more or less the same and are the category quantifications looking all right? These questions can be answered with a 'yes' (the results are not given because of the space limitations).

Table 5: correlation between the overall index and indexes for several social groups (2004)

	correlation with index for all	**eigenvalue**
All	1,00	0,39
18-24 years	0,83	0,35
25-34 years	0,92	0,33
35-44 years	0,97	0,34
45-54 years	0,97	0,36
55-64 years	0,97	0,36
65-74 years	0,97	0,42
75 years or older	0,93	0,45
men	1,00	0,37
women	1,00	0,42
income below poverty line	1,00	0,37
income above poverty line	0,97	0,40
lower education	0,99	0,40
middle education	0,95	0,33
higher education	0,96	0,30
living alone	0,99	0,47
not living alone	0,99	0,34
live in the 4 biggest Dutch cities	0,98	0,43
does not live in the 4 biggest Dutch cities	1,00	0,39

Bron: CV'04

We could also go one step further and use the weights we got from the above analysis for the complete sample. When doing so, we find that the final results are pretty much the same again. Two examples are presented in table 6; the one with least correlation (18-24 years old) and one of the subgroups with the maximal correlation (we choose women).

Tabel 6: raw scores on life situation indices on the basis of different weighting schemes (means score is 0 for each index, 2004)

	index based on the weights got from analyzing		
	all	women	18-24 years old
one person Household	-0,60	-0,56	-0,59
one parent family	-0,28	-0,28	-0,25
couple without children	0,06	0,06	0,03
couple with children	0,29	0,28	0,31
other	-0,28	-0,27	-0,24
no educattion, only primary school	-1,17	-1,11	-0,98
lower vocational education	-0,35	-0,33	-0,29
lower general secondary education	-0,13	-0,12	-0,04
intermediate vocational education / pre university	0,16	0,15	0,12
higher vocational education / university	0,51	0,48	0,41
men	0,03	0,03	0,02
women	-0,03	-0,03	-0,01
18-24 years old	0,18	0,16	0,14
25-34 years old	0,26	0,25	0,19
35-44 years old	0,29	0,28	0,28
45-54 years old	0,21	0,20	0,20
55-64 years old	-0,02	-0,02	0,00
65-74 years old	-0,42	-0,40	-0,40
75 years or older	-1,51	-1,42	-1,28

Next we tried to vary the base year that is used for the weights. Our normal procedure is to add every new dataset to the others and calculate the weights on this combined dataset. Alternatively we could use only the weights for, the first or the last year and apply these to all other years. Again, this appears to have little to no effect on the results (see table 7).

Table 7: life situation scores, using different weighting schemes (indexscroes, with 1997 taken as base year)

	using the weights from year				
	1997	1999	1997+1999 combined	2002	1997+1999+2002 combinded
1997	100	100	100	100	100
1999	101,1	101,2	101,2	101,2	101,2
2002	101,5	101,9	101,7	102,0	101,9

Finally we tried using no weights at all. When we just add up all indicators, we get a correlation between the index without weight and the 'original -overals- index' as high as .92. Still, we did not correct for the differences in number of indicators in each set and the number of possible answers for each indicator. Without doing so, the maximum score for leisure activities is 21 and for holidays only 5. Another problem is how to know what the order of nominal indicators has to be: is living in a student flat better than living in an old people flat?
And the last problematic point is that for a fairly huge group no score is calculated (that is: for people with missing values; 1662 instead of the maximum of 2003 people got a score).
To overcome these problems, we added a few corrections:

a. we divide the indicator score by its maximum, or we add-up the indicators for each domain and then divide by the maximum domain score
b. to overcome missing values, we divide the score by the number of domains that someone has a valid score for.

c. to rank the nominal indicators we use the Overals results (which of course is not that fair, as we eventually want to see if there are any differences between constructing an index with Overals or just by adding up the indicators; but it is a way to order the nominal indicators)

We now have five possibilities

1. *noweight 1* just adding up the indicators (missing value means no score);
2. *noweight 2* indicators are divided by there maximum, then added up (missing value: no score);
3. *noweight 3* indicators are added up within each domain, then divided by the maximum score per domain, tehn added up across domains (missing value: no score);
4. *noweight 4* the same as 2, only now a missing value only results in a missing score on that domain;
5. *noweight 5* the same as 3, only now a missing value only results in a missing score on that domain.

All five indices have high correlations with the (original) Overals-index: all higher coefficients than .90 (see table 8). Besides, there are also only very small differences when we break up the index-scores for various social groups (not shown).

Table 8: correlation between the overals-index and indices where the indicators are just added-up

	overals-index	noweight 5	noweight1	noweight 2	noweight 3	noweight 4
overals-index	1,00					
noweight 5	0,94	1,00				
noweight1	0,92	0,97	1,00			
noweight 2	0,96	0,99	0,97	1,00		
noweight 3	0,94	1,00	0,97	0,99	1,00	
noweight 4	0,94	0,97	0,97	1,00	0,99	1,00

NB: de clusters zijn hier geoptimaliseerd voor samenhang met de leefsituatie-index (dwz geherkodeerd naar overals-kategoriekwanticaties)
Bron: SCP (CV'04).

What we **did** find was that results became unreliable when we used purely random weights, that is: we did not even check for the proper direction of the signs (correlations with the original weighted index becoming as low as .04). The conclusion is that at least the weights have to have signs in the proper direction: positive categories (like sporting) have to be weighted positive and negative ones (like not sporting) have to be weighted negative. The exact size of the weight is less important.

Why then should we use different weights? The above analyses show only neglectible differences between an index based upon OVERALS and an index without weights at all. We still use different weights for the indicators and we still use OVERALS because the weights give insight in the different importance of the indicators used. Using this statistical technique not only shows that, for example, sporting is more important than housing, but also that sporting once a week is more important than living in a flat. Besides: the differences between not sporting at all, once a week or twice a week are not the same (though the category scores can be 1, 2 and 3). We also found that *more* is not always *better*: looking at the category quantifications of participation tells us that not only little participation leads to a less positive life situation, so does participating a lot too. There seems to be a maximum in participating that is good for your life situation. This can be explained by the time frame: as we all have a limited amount of time: the time spent on doing volunteer work cannot be spend on other activities.

Another problem with just adding up indicators is that with nominal indicators it is not clear in advance which categories are better and which are worse.

Besides, the chosen method of using OVERALS makes it possible to check whether the assumptions we make are right. That is: all indicators have to be related to the central concept (i.c. have reasonable weights) and the categories have to be in the right direction (sporting is positive, not sporting negative; this check can be made via the category quantifications). If this is not the case, the indicators can be left out. This procedure of checks is not available when we would have chosen just to add up the indicators.

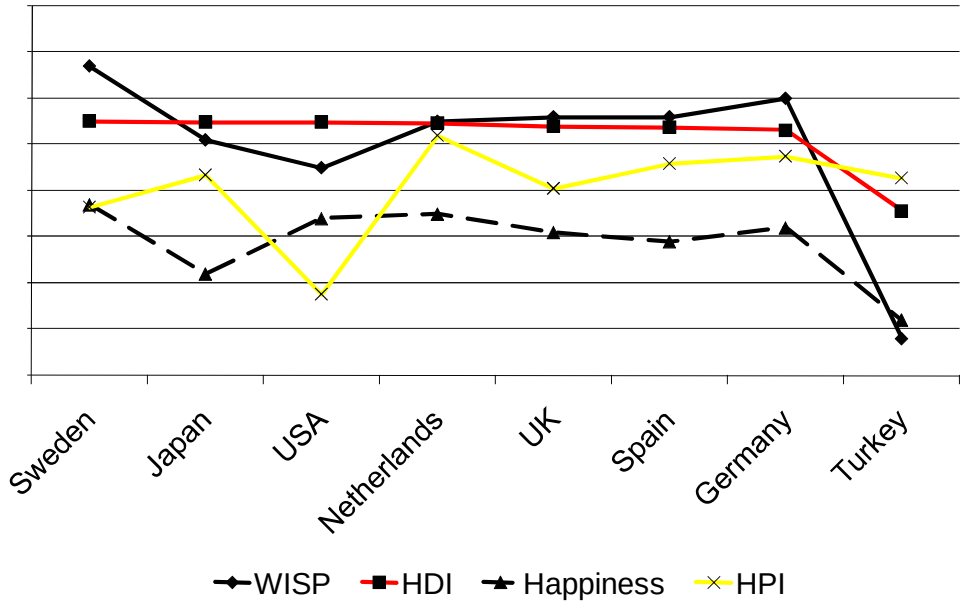
7. Does the choice of domains and indicators matter?

One final test we conducted is about the choice of domains and indicators: does this choice matter? To find an answer to this question, we start off by looking at some of the most successful indices that are available internationally: the Weighted Index of Social Progress (WISP) of Richard Estes (Estes, 1988), the Human Development Index (HDI) of the UNDP (UNDP, 1990), the Happy Planet Index (HPI) of the New Economics Foundation and happiness, taken from Ruut Veenhovens World database of happiness on the internet. All of these indices are different: they have different domains.

Happiness is the least extensive indicator, and actually not an index but only 1 question, whereas the WISP is the most extensive index, it has 10 domains and 40 indicators. Both the HDI and the HPI have 3 domains, one important difference being that HPI is the only one to include the environment, using the ecological footprint.

We look at the scores on these indices for eight countries (see figure 5). For a proper interpretation of the figure, it is good to know that what is shown, is neither the ranking of the countries nor the actual index-score on the indices. To fit the figure, some actual scores are adjusted to fit on the same scale (1-10), the actual WISP-score is divided by 10, HDI-score is multiplied by 10, happiness is unchanged, HPI-score is divided by 5.

Figure 5: a selection of countries on 4 high standard international indices



What is shown is that, of these countries, Sweden scores best on all indices, except for the Happy Planet Index, where the Netherlands are number one. But. Not all indices lead to the same ranking of countries, thus suggesting that the choice of domains is important.

Is this a problem? It is, when the used concepts are the same, but it is much less a problem when the concepts that these indices try to measure are not the same, even though they are clearly related. In the example we just discussed all concepts were different, though related. Even without discussing the definition of the concepts, it is clear that there is some relation between Social Progress and Human Development, but they are not the same. So what really is important is to operationalise the concept you want to measure properly: every different concept has its own domains.

But then: what happens when you choose domains that are not related to the concept you want to measure? We tested this by constructing indices with domains which in advance had nothing in common. We first added to the life situation index a domain of some indicators of debts (unpaid rent, electricity-bills and so on). As this domain has little in common with the other domains, Overals gives the indicators only low weights. Therefore, the core structure of the index is unchanged and the

correlation with the index without debts is almost 1.00. The category quantification of the added indicators are, however, in the right direction: having debts goes together with a bad life situation.

Then we added another domain, with subjective indicators about institutional trust. Now the category quantifications are not always in the right direction. Sometimes distrust goes with a good life situation, sometimes trust goes with a good life situation. But again, the weights assigned to the indicators by Overals are low, so the structure of the index remains more or less the same.

Until now we only made some adjustments to the domains we already had included in the index, with which we, as we know, can make a robust index. That the choice of domains really matters becomes clear when we just more or less randomly put domains together. When we try to construct an index with (the life situation domain) mobility, opinions on immigrants and contact with public agencies we get an index that has only a low correlation with the life situation index. Also the direction of the indicators and the category quantifications are not interpretable. Though the index has an eigenvalue of .43, which is comparable with the eigenvalue of the life situation-index - only with less domains, these domains do not form a useful nor interpretable latent construct.

We now know that it is important to choose the right domains. But does it matter which indicators we choose within these domains?

Our experiences with the Dutch Life Situation Index show that the actual choice of indicators is of lower importance. At an earlier stage of the index, income and education were included in the index proper. Their removal had only very little effect on the overall results. Besides we sometimes change indicators, because of obsolescence: slide projectors and electric sewing machines have made way for personal computers and CD players. These changes too had very little effect on the outcomes.

That we can change indicators from time to time is the better for the index, as obsolescence is an important, but not the only reason to change indicators from time to time. Another reason is the changing spirits of time. When society and policy are changing, an instrument designed to study developments within them must not lag behind. For example, we now include a measure of loneliness in the index.

But we also have to remember that we make normative choices. The various components of the LSI have always been and will always be the subject of debate. Fortunately, until now, these debates always ends up with a better index for measuring the life situation in the Netherlands.

8. Conclusions

In the last 30 years the Life Situation Index has proven its value for monitoring developments of the life situation in the Netherlands. Without the index it is much harder to grasp the, sometimes even opposite, developments of the separate domains and indicators. This becomes clear at writing one of the two major SCP-reports, called the social state of the Netherlands. In this report there are various domain chapters describing developments within that domain. It appears to be very difficult to draw conclusions on these divers developments. However, when we take the life situation index as starting point this leads almost automatically to the conclusions which groups are better or worse off. Then we colour this in with indictors from the domain chapters.

Doing so, the results of the index have always been interpretable and could be further explained by other (data)resources. For an index to be interpretable in this way, it is important to distinguish between resources, the life situation and the evaluation of it. The conceptual framework has proven its value too, because it makes it possible to provide policymakers with tools to improve the life situation (and even better: via the life situation to improve happiness).

The life situation index is based on survey questions. This is the only proper way to examine the relations between all indicators. With the LSI we got good results for the Netherlands, but it is (yet) very hard to get good survey data for comparing countries.

When trying to make a good index, it is necessary to have a proper operationalization of the concept you want to measure, but also to keep in mind that the choice of domains seems more important than the choice of indicators. However, further analysis about the importance of choosing domains is necessary.

At constructing the index, using unequal weights is not necessary but it is advisable to cope with nominal indicators and to get better insight in 'real' differences between categories. Using Overals to solve the weighting problem has numerous advantages, like defining domains in the analysis too; the possibility to include nominal indicators; provides checks for assumptions made for the direction of indicators and for the correlation between indicators (as well as with the latent construct)

And lastly, for the ones whose primary interest is in subjective indicators or happiness: aggregation of indicators to the life situation index tells us more about happiness than each of them separately.

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Appendix 1: Indicators of the Life Situation Index

Health

1. is hampered at activities at home as a result of one or more longlasting illnesses, disorder or handicaps
2. is hampered at leisuretime activities at sporting or at traveling as a result of one or more longlasting illnesses, disorder or handicaps

Housing

3. type of home
4. house owner or house renter
5. number of rooms (bedrooms, living rooms and studies)
6. size of living room

(Social) participation

7. index for social isolation:
    a. I have people I can really talk to
    b. I feel isolated from other people
    c. there are people I can get help from
    d. I have people that really understand me
    e. I am part of a group of friends
    f. my social contacts are superficial
8. does volunteer work for:
    a. choral-, musical-, or drama society
    b. sports club
    c. hobby club
    d. political organisation
    e. trade union, employers organisation
    f. religious or philosophical society
    g. school, crèche or playgroup
    h. helping neighbours, the elderly or the handicapped
    i. organisation with societal goals (like human rights, nature of animal protection)
    j. local neighborhood organisation
    k. specific organasation for ethnic minorities
    l. other association or organisation

Sporting

9. number of different sports
10. number of times a week sporting

Cultural leisure activities

11. visiting cultural amenities:
    a. concert classical music
    b. popconcert
    c. opera
    d. a play
    e. ballet
    f. cabaret performance
    g. musical
    h. film
    i. museum
    j. disco, dance or houseparty
12. membership of:
    a. choral-, music-, or drama society
    b. sports club
    c. hobby club
    m. political organisation
    d. trade union, employers organisation
    e. library
    f. religious or philosophical society
    g. specific organisatoion for ethnic minorities
    h. other associaton or organisation
13. diversity of hobbies

Possession of consumer durables

14. dvd-player (not in pc)
15. microwave
16. dishwasher
17. personal computer

Mobility

18. car ownership
19. possession of public transport season ticket

Holiday

20. has been on holiday pas 12 months?
21. was holiday in foreign country?