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Laban Movement Analysis (LMA)

► Dance and the Quality of Life

Labels

► Nominal Scales

Labor Contracts

► Dead-End Jobs

Labor Hoarding

► Labor Markets and Underemployment

Labor Market Discrimination

► Employment Discrimination

Labor Market Exit

► Retirement Effects, Quality of Life

Labor Markets and Underemployment

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Synonyms

Excess labor supply; Hidden unemployment; Involuntary part-time work; Job (mis)match; Labor hoarding; Overeducated employed people; Underworked

Definition

Underemployment on the labor market pertains to excess labor supply or the underutilization of labor within the firm or organization with respect to working time, earnings and productivity, occupational status, and skills. Workers might actually work fewer hours than they prefer because of lack of demand (excess supply, involuntary part time, underworked); they are less productive that corresponds to their working time and/or wage (hidden unemployment); they work in a job that

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is below their occupational status level (occupational mismatch), or they offer higher skills than the work requires (overeducated). The reverse situation might also occur that the workers' capabilities are below the demands of the employer. In any of these events, there is a mismatch between the worker and the job which might adversely affect the worker's job satisfaction, their subjective well-being, and mental health.

Description

Job (Mis)match and Well-Being

The relationship between job (mis)matches and subjective well-being and mental health has been extensively studied in psychology over the last 25 years. The main topics of study concern the association between on one hand work orientations (the perceived importance of particular job characteristics like a good wage, nice colleagues, and work autonomy), work stress, the work-family balance (Frone, Quick, & Tetrick, 2003), job insecurity (de Witte, 1999) and on the other hand job satisfaction, mental health, and psychological well-being. In the management literature there is increasing attention for the psychological contract (e.g., Rousseau, 1995) and the consequences for job satisfaction, subjective health, and well-being. Work stress, family conflict, and job insecurity show strong negative correlations with job satisfaction, psychological well-being, and mental health. Recent studies in social psychology looked at the relationship between the extent by which the job matches people's aspirations and emotional well-being (Jacob, 2008). Friedland and Price (2003) showed a negative relationship between underemployment in terms of hours, wages, skills, and status and subjective well-being and subjective health. Another psychological study by Schnittker (2007) reports a positive relationship between mothers' larger involvement in work and longer working hours and self-rated health.

In sociology Townsend and Gurin (1981) examined the relationship between role-fit and subjective well-being, while there is abundant literature on the relationship between gender-roles, work-family balance and conflict, and life satisfaction (e.g., Allen, Herst, Bruck, & Sutton, 2000; Fahey, Nolan, & Whelan, 2003; Gregory & Milner, 2009; McGinnity & Whelan, 2009; Voydanoff, 2005). Andersen (2009) showed strong negative effects of unemployment on subjective well-being especially for people belonging to the lower social classes. In the discipline, Hakim's preference formation theory has been influential (Hakim 2000), stating that women at the start of the career make purposeful choices for making a career and postponing children (work-oriented women), to build a family and raise children (family-oriented women), or for combining having a family and making a career (adaptive women). She showed that the share of adaptive women in modern labor markets is rising. The theory suggests that women's well-being very much depends on how successful they are in realizing their career preferences.

Muffels and Kemperman (2011) use panel data on Germany to examine the impact of work orientations but also of work-care choices of women on subjective well-being and the interaction with the job match (the hours fit). They presumed the impact of women's career preference and work-care choices on subjective well-being to be associated with the hours fit. Whether or not women's work-care choices match their working time preferences reveals the influence of actual constraints on the labor market as well as time constraints (Crompton & Lyonette, 2006) and shows the time squeeze or combination pressure women face (Gershuny, 2000; Van der Lippe & Van Dijk, 2002). Women gain in well-being by fulfilling "multiple roles" while combining work and care but up to a particular limit or ceiling in terms of hours spent after which well-being declines strongly due to the time pressure they face. The positive effect of a job match or fit on well-being can in these circumstances not compensate anymore for the negative effect of the "time pressure" these women face. Younger cohorts are combining more, but whether they gain in well-being compared to the older cohorts depends strongly on the job match especially when they are engaged in demanding work-care combinations.

In economics the focus has been on the impact of underemployment and overeducation on the firm's productivity but less on the worker's subjective well-being although some authors explicitly investigated the relationship with job satisfaction (Büchel, 2002) and subjective well-being (Verhaest & Omey 2009). Most attention has been paid to examine the relationship between (long-term) unemployment and subjective well-being (Clark & Oswald 1994; Clark 2010; Winkelmann & Winkelmann 1998), but Booth and Cools (2007) also investigated the association between underemployment and investment in education for British women. Wilkins found significant negative effects of underemployment on income, welfare dependence, and subjective well-being for Australia in the early 2000s especially for part timers seeking full-time work (Wilkins, 2007). For the same country Wooden, Warren and Drago (2009) using Australian panel data (HILDA) showed that it is not the number of hours that matters for subjective well-being but the mismatch between desired and actual hours (Bender & Skatun 2009). A similar finding on the effect of the work-leisure choice measured by the gap between preferred and actual number of hours work was found in a study of Headey, Muffels, and Wagner (2010).

Discussion

There is increasing evidence on the strong association between the quality of the job match and job satisfaction and subjective well-being especially in psychology. The interest in sociology and economics on this relationship is increasing especially in the last 10 years corroborating the findings in psychology. They also show that the relationship between work and well-being is rather complex with a view to disentangling the joint impact of work-leisure preferences, career choices, and labor market constraints on outcomes with a view to job satisfaction, subjective well-being, and mental health. The increasing availability of long-running panel data has helped to better unravel the complex interrelationships between these factors. To research the influence of genetic factors, innovative experimental approaches are needed to examine how genetics might affect the relationships with well-being and health. Increasingly also survey evidence becomes available on these biomarkers of well-being because of which progress can be made to increase our understanding of the intriguing relationships between work, the labor market, and subjective well-being and health.

Cross-References

- ▶ Experimental Design
- ▶ Family Conflicts
- ▶ Job Satisfaction
- ▶ Job Security
- ▶ Underemployment
- ▶ Work Time

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Laboring Boys in Urban India

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Synonyms

Child labor in urban India

Definition

In the guidelines of International Labour Organization (ILO), work is defined in terms of economic activity in the sense of the System of National Accounts (SNA) 1993 for measuring gross domestic product (GDP). Briefly, economic activity covers all market production (paid work) and certain types of nonmarket production (unpaid work), including production of goods for own use. Therefore, whether paid or unpaid, the activity or occupation could be in the formal sector or informal sector and in urban or rural areas (ILO, 2002). "Child labor," as defined by ILO, consists of all children under 15 years of age who are economically active, excluding (1) those who are under 5 years old and

(2) those between 12 and 14 years old who spend less than 14 h a week on their jobs, unless their activities or occupations are hazardous by nature or circumstances. Hazardous activity is defined as any activity or occupation, which, by its nature or type, has, or leads to, adverse effects on the child's safety, ▶ health (physical or mental), and moral development (▶ self-esteem). Added to this are 15–17-year-old children in the worst forms of child labor (International Labour Organization [ILO], 2006).

The National Sample Survey of India (NSS) does not collect hourly data and defines child worker in terms of usual activity status of the child, namely, child worker in usual principal activity status and child worker in usual subsidiary activity status. Child workers in usual principal activity status are those who are in 5–14 years age group and spent relatively longer time on economic activities during the 365 days preceding the date of survey. On the other hand, child workers in subsidiary activity status are those who are in 5–14 years age group and spent for a minor period, which is not less than 30 days on economic activities, during the reference year. Economic activities are those included in production boundary of the Indian System of National Accounts (ISNA) (National Sample Survey Organization [NSSO], 2006). Hence, "child labor in urban India" can be defined as those children (5–14 years) who are economically active in usual principal activity status in urban sector of the country. Considering the guideline of ILO that for the children between 5 and 11 years, any engagement in economic activity is a denial of normal childhood, children of this age group, who are economically active in usual subsidiary status, should be considered as "child labor" in Indian context.

Work has been defined in the Indian Census as "participation in any economically productive activity with or without compensation, wages or profit." Such participation could be physical and/or mental in nature. Workers in general are classified into main and marginal workers by the population census. Main workers are defined as those who have worked for the major part of the reference period, that is, 6 months or more. And marginal workers are those who have not worked for the major part of the reference period (Census, 2011). Hence, for census data, "child labor in urban India" can be defined as those children (5–14 years) who are engaged as main workers in urban sector of the country. Children, in 5–11 years age group, who are engaged as marginal workers in urban sector of the country, also should be considered as child labor in Indian context.

Description

Motivation

The issue of child labor is closely related with ▶ human capital formation of a country as early entry into labor market not only leads to the denial of normal childhood, but implies a compromise with the extent of human capital formation and a corresponding loss in future earning. Global estimates, made by the ILO, show that the incidence of child labor is very high in developing countries and statistics reveal that India has the highest in the world (ILO, 2006). So there is no doubt that in India the issue of child labor is a serious one. Child labor, so long a cheaper substitute of adult labor, would have its demand in the market for unskilled work and so trying to solve the problem from demand side needs legal interventions. But studies show that though there are some laws to protect child laborers, there is also evasion of those laws. The study made by Swaminathan (1998) in Western India revealed that children work at simple repetitive manual tasks that do not require long years of training or experience in low-paying hazardous work that involves drudgery and forecloses the option of school education for most children.

However, the proper control, if comes from the supply side such that the parents themselves will withdraw their children from the labor force, offers a permanent solution to this problem. Hence, supply side management is expected more pertinent strategic role to play. As the labor market opportunities are more diverse for

urban children, especially for urban boys, than their counterpart in the rural sector, they need some special attention. Supply side analysis carried out by Das and Mukherjee (2007) is a pioneering one in this field, as prior to the availability of NSS unit-level data, no such in-depth study was feasible. The database utilized for the analysis was extracted from the NSS survey on "Employment and Unemployment Situation in India" for the 55th large sample round (1999–2000). In this study, following broad issues were addressed in urban Indian context:

- Return to investment in schooling (human capital) in labor market
- Incidence of child labor and dropout
- Socioeconomic determinants of child labor and dropout decisions
- Socioeconomic determinants of child labor decision in manual/nonmanual type of work
- Socioeconomic determinants of child labor decision in hazardous/nonhazardous type of work

Literature

The issue of small children toiling long hours while they should devote their time to ▶ education and training, forming future human capital, has raised an intense debate concerning child labor since the middle of the nineteenth century, when children were drawn into an industrial setting. Since then the policy makers and the researchers have attempted to find out the causes and consequences of child labor. The supply side analysis of child labor is closely related to the modeling of household behavior. A family will send the children to the labor market only if the family's income from non-child labor sources drops very low (Basu & Van, 1998). In developing countries, inadequate school facilities and poor teaching quality are also responsible for child employment. This reduction in schooling is accompanied by an increase in work, with boys more likely to work. While it is true that many children drop out of school because they have to work, it is equally true that many become so discouraged by school because of the inferior quality of education provided (NSSO, 1997; Ray, 2000; & The Probe Team, 1999). Another potential factor influencing child labor decision is the linkage between social capital and economics of education. Loury (1981) was one of the pioneer authors to introduce social capital into the economics of education. He explained how differences in socioeconomic background determine the eventual education that an individual would receive. Coleman (1988) popularized the concept of social capital with its role in the creation of human capital. Janssens, Gagg, and Gunning (2004) showed how both the social and ▶ cultural capital of a child's family shape a young child's cognitive and social developments and how it influences the decisions of a child's parents regarding length and quality of its education. In recent years, there has been some empirical work on child labor in hazardous occupation. However, the focus has been on estimating the long-term adverse health effects of child labor (Beegle, Dehejia, & Gatti, 2009). The rest of the empirical research on child labor in hazardous occupations essentially consists of descriptive statistics on child work-related injury or illness rates. The work of Dessy and Pallage (2005) on the predictions regarding the relationship between child wages and child occupational harm, showing positive compensating wages for child occupational harm, differs from the work by Rogers and Swinnerton (2004), showing negative compensating wages, that is, poor working conditions being accompanied by low wages.

Study in Indian Context

In Das and Mukherjee (2007), a detailed supply side analysis was carried out in urban Indian context. The most important difference between their study and any previous study is that it is the first in-depth study using unit-level data of NSS, exploring all possible socioeconomic variables, responsible for child labor decision, at all India level. Child labor does mean absconding from education. This is likely, provided that the return from available education in the labor market is low for adult labor. So, the first task that Das and Mukherjee set was to check whether there exists

any wage premium for education in adult labor market. The first set of test hypotheses, as stated in their study, was as follows:

- H_{1A}: there is no wage premium for education in adult labor market.
- H_{1B}: there is no wage premium for education in the informal sector for adult labor.

The next question is whether similar incentives exist in the child labor market. It was verified by testing the following hypothesis:

- H_{1C}: there is no wage premium for education in the child labor market.

Now if these sets of hypotheses are accepted, even then parents may have some noneconomic, that is, purely social, inclination towards educating their children and this propensity would be contingent on the standard of parental education. So the second task is to explore the linkage between parental human capital and children outcomes in terms of extent of schooling, tendency to drop out, and decision to work as child labor. Hence, the second set of hypotheses tested by Das and Mukherjee (2007) was:

- H_{2A}: parental education levels do not influence dropout decision for the child.
- H_{2B}: parental education levels do not influence the decision to employ the child in the labor market.

For the incidence of manual and harmful child labor, Das and Mukherjee (2007) formulated the following two hypotheses:

- H_{3A}: parental education levels do not influence the decision to employ the child in manual occupation.
- H_{3B}: parental education levels do not influence the decision to employ the child in hazardous occupation.

For testing the hypothesis H_{1A}, Das and Mukherjee (2007) fitted the adult male's earning function (considering both formal and informal sectors together), taking adult's age and adult's education as explanatory variables. The square terms, that is, square of adult's age and adult's education, were also incorporated into the model to explore the quadratic effects, if any. Similar kind of adult male's earning function was fitted for informal sector also, in addition to a linear one for testing H_{1B}. The test results of H_{1A} and H_{1B} showed substantial premium for education in the adult labor market. For the first case, the wage premium for education is strictly increasing and convex. Thus, higher education is rewarded more strongly. When we look only at the informal sector, the wage premium is negative for low levels of education but positive for higher levels, the break-even point being at the secondary level. Thus, the incentives for staying in school for a substantial number of years are quite strong in the adult labor market.

There has been very little work on estimating earning equations for child workers in general. In Das and Mukherjee (2007), three types of regression equations were estimated for testing H_{1C}. One is with child earning as a linear function of child education; second one is with child earning as a quadratic function of child education; and in the third earning function, age is taken as an added explanatory variable. The linear model is insignificant, but interestingly, the quadratic model has both coefficients weakly significant and of the same nature as for the adult wage model, the break-even point being at the completion of primary schooling. So, in a weaker sense (may be for some of the activities) the education premium is present even in the child labor market. It is worth mentioning here the work of Smith and Welch (1989), where they documented a sharp positive relationship between years of schooling (even for incomplete schooling, like 0–4 years or 5–7 years of schooling) and wage, for black and white American males during the period 1940–1980. The structure of the labor market for black Americans would be similar to the informal markets in countries like India at the present time. This provides indirect evidence for wage premium (partial) for education in the developing countries at the present time.

In Das and Mukherjee (2007), probit regression analysis was used to explain family decisions on dropout, child labor, child employment in manual occupation, and child employment in hazardous occupation, for 21,355 sample children, between 5 and 14 years, in urban areas all over the country. As these decisions are not observable (latent variables),

they defined a set of observable dummy variables Y_i's (i = 1,. . ., 4) as follows:

$Y_1 = 1$, in case of occurrence of school dropout incidence; 0 otherwise

$Y_2 = 1$, in case of occurrence of child labor incidence; 0 otherwise

$Y_3 = 1$, if child occupation is manual; 0 otherwise

$Y_4 = 1$, if child occupation is hazardous; 0 otherwise

For testing H_{2A} and H_{2B}, father's and mother's educations were taken as two explanatory variables. To explore all possible socioeconomic variables, available in NSS survey data, other explanatory variables considered were household size, income equivalent variable (monthly per capita expenditure), and ethnicity (► religion dummies and caste dummies). Both mother's and father's educations turned out to be significant with the intuitively expected sign. This establishes the hypothesis that parental education has a significant contribution to the decisions in these respects. What is more important is that mother's education, even in the presence of father's education as a predictor variable, had stronger contribution to these decisions in the family. On the whole, as expected, MPCE had a significant impact; religion and caste dummies also showed strong impact on these decisions.

Regarding the testing of hypotheses H_{3A} and H_{3B}, Das and Mukherjee (2007) included two additional explanatory variables, namely, child's wage and child's education along with all other explanatory variables considered for dropout and child labor decisions. For child employment in manual and hazardous occupations, mother's education appeared as the more important factor in curbing these incidences, supporting earlier findings that women's empowerment (one important indicator of which would be the female's educational level) is indeed instrumental in increasing parental awareness.

Discussion and Future Scope of Research

Although the study made by Das and Mukherjee (2007) was the first attempt in doing an in-depth, all India-level study, using large sample unit-level data of NSSO, it is subject to certain limitations with scope for future research. The analysis was confined to the problem for the country as a whole. However, it is equally important to know the problem at state level getting a complete picture of the reality in India that can act as a basis for planning at the state level. A state-level analysis of interstate variations would indicate right diversion to be followed. The analyses of child employment in manual and hazardous occupations are largely limited in terms of size of the sample. It is difficult to infer on very few cases, and so, a policy analysis is not feasible on the basis of the proposed regression model. So there is future scope of research in these areas. Mention may be made of some studies done in the context of some other developing countries. Guarcello, Lyon, and Rosati in 2004, as reviewed by ILO (2007), examined the relationship between the intensity of children's work (i.e., children's weekly working hours) and their health outcomes, making use of household survey data from Bangladesh, Brazil, and Cambodia. The work of Francavilla, Guarcello, and Leon in 2003, as reviewed by ILO (2007), used survey datasets from six countries, namely, Guetemala, Zambia, Peru, Guinea, Brazil, and Kazakhastan, in an attempt to find a relationship between children's involvement in household chores and its impact on their health. Finally, it is not enough to explore the correlates of child labor. Empirical studies that simultaneously examine the various factors impacting on child labor and child schooling, such as returns to education in adult and child labor market, ► poverty, credit access, market conditions of child labor, household responsibilities, school expenditures, parental education levels, and ► community characteristics, are very few. Multivariate studies addressing all these issues may contribute more to the understanding of child labor in any country context.

Cross-References

► Community
► Poverty
► Social Development

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Lack of Care, Children

► Child Maltreatment: Neglect

Lack of Measurement Bias

► Measurement Invariance

Ladder of Life

► Cantril Self-Anchoring Striving Scale

Laeken Indicators

► European Union Indicators

Lake Erie Quality Index

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Synonyms

State of the lake report

Definition

The Lake Erie Quality Index is a multi-metric tool used to evaluate the overall health of the lake. The index focuses on many aspects of the lake including water quality, human health risks, pollution sources, aquatic habitat, aquatic biology, public use, ► land use, and the economy.

Description

The *Lake Erie Quality Index* is a status report on the state of Lake Erie created by the Ohio Lake

Erie Commission (Ohio Lake Erie Commission, 1998 & 2004). The Ohio Lake Erie Commission is a state agency comprised of the directors of the Ohio Departments of Agriculture, Development, Health, Natural Resources, and Transportation, as well as the Ohio Environmental Protection Agency. The intended audience of the report is the millions of people who live on Ohio's Lake Erie shoreline, drink its waters, play on its beaches, and fish its depths. The selection of indicators and metrics is based on their importance and interest to most Ohioans. The metrics and indicators utilize, when possible, existing historical databases and ongoing monitoring programs. The Ohio Lake Erie Commission's goal for this index is to determine whether Lake Erie is getting better or worse. Contained within this report are data sets supplied by all levels of government, academia, and private business. These ongoing monitoring efforts are intended to enable future updates to be produced using methods consistent with this report's data. The *index* focuses on Ohio's lake resources and the activities taking place within Ohio that affect Lake Erie.

The *Lake Erie Quality Index* is organized into 11 separate indicators. These indicators address several important aspects of the lake including the environment (*ambient water quality*, *human exposure risks*, *pollution sources*, *aquatic habitat*, and *biological*) public use (*coastal recreation*, *boating*, *fishing*, and *beaches*), *land use*, and the *economy*. These 11 indicators are expanded into 32 separate metrics ranging from 1 to 5 metrics per indicator. Each metric measures a particular aspect of the overall indicator that is compared to an established goal and scored.

The metrics for each indicator are:

Ambient Water Quality: water chemistry, water clarity, contaminated sediments, toxic compounds

Human Exposure Risks: fishable, swimmable, drinkable

Pollution Sources: point sources, watershed sources

Aquatic Habitat: aquatic habitat quality

Land Use: green area conversion, wetlands, shoreline hardening

Biological: key indicator species, shoreline/tributary Index of Biotic Integrity, offshore plankton Index of Biotic Integrity, offshore fish Index of Biotic Integrity, coastal wetland Index of Biotic Integrity

Coastal Recreation: quality of recreational facilities, public access

Boating: boating satisfaction, dockage, boat launching facilities, boating safety

Fishing: fishing satisfaction, angler success, shoreline fishing, fishing participation

Beaches: beach quality, beach availability

Economy: tourism, shipping

Two different scoring systems are used in the *index*. When parameters are measured against a given numerical goal, the percentage attained is compared to a straight sliding scale. At other times, the data is compared to a four-point scoring system similar to a grade point average. This scoring system is used for those metrics derived from survey information.

The scores of the individual metrics are weighted according to their importance, then tallied to produce a rating for the overall indicator. The four descriptive ratings used in the *index* are excellent, good, fair, and poor.

For some of the metrics in the *index*, no rating or scoring is given. In these cases, the information that was available for the metric was either not recent or there were no established goals to make a meaningful comparison. A discussion is presented for each of these topics, but their score did not influence the overall rating for the indicator. It is expected that these sections will be updated or more fully developed by the release of the next *index*.

The results from the *index* are used to help direct the Lake Erie Protection Fund, a grants program that supports projects that address all aspects of the lake. The *index* is also used to refine the Lake Erie Protection and Restoration Plan (Ohio Lake Erie Commission, 2000 & 2008) and identify priorities for needed support from the federal government or other Great Lake states.

The Lake Erie Quality Index was released in 1998 and 2004. The next release is scheduled for 2014. The most recent version of the report can be

found on the Ohio Lake Erie Commission's website (http://www.lakeerie.ohio.gov).

Cross-References

► Land Use

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Lancashire Quality of Life Profile

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Synonyms

Lancashire scale; LQLP; LQOLP

Definition

The Lancashire Quality of Life Profile is an instrument for obtaining a detailed quality of life profile, encompassing general quality of life as well as satisfaction with different life domains and subjective as well as interviewer-assessed quality of life.

Description

The Lancashire Quality of Life Profile (LQOLP) was devised for people with schizophrenia and other psychoses (Oliver, Huxley, Bridges & Mohamad, 1996) and was derived from Lehman's quality of life interview (Lehman, Ward & Linn, 1982). Besides a global rating of quality of life, the original LQOLP comprises nine life domains: living situation, family, social relationships, leisure activities, work/education, finances, personal safety, health, and religion. Each domain is covered by items pertaining to both objective life circumstances and satisfaction with the life domain in question. The subjective ratings are made on a seven-point scale with two anchors (1 = could not be worse; 7 = could not be better). Inspired by other researchers, the team that developed the LQOLP wanted to adopt a wide view of quality of life. They therefore added a slightly revised version of Cantril's ladder to obtain a self-rating of global well-being. They further included the Bradburn's Affect Balance Scale and Rosenberg's Self-Esteem Scale. As another complement, they added an interviewer rating of the patient's quality of life (Spitzer et al., 1981). As a result, the LQOLP generates a profile of quality of life scores, based on subjective ratings of the domains, as well as several separate well-being assessments and objective information about life circumstances.

Usability

LQOLP takes between 20 and 45 min to complete, depending on the target group and the interviewers' experiences with the instrument. Oliver and associates (Oliver, Huxley, Priebe & Kaiser, 1997) found that 91 % were willing to be reinterviewed, indicating that they were comfortable with going through the LQOLP interview. The interviewer also rates the reliability of the responses, and in the study by Oliver et al. (1997), the interviewers estimated that 89 % of the respondents gave very or generally reliable responses. The LQOLP can be used with severely ill patients, such as elderly with dementia (Mozley et al., 1999) and psychotic patients with cognitive deficits (Reininghaus, McCabe, Burns, Croudace & Priebe, 2012).

Psychometric Properties

The LQOLP has been translated to several languages and has shown mostly sound

psychometric qualities in different European and North American contexts in terms of test-retest reliability and internal consistency (Gaite et al., 2000; Hansson, Svensson & Björkman, 1998; Oliver et al., 1997; van Nieuwenhuizen, Schene, Koeter & Huxley, 2001). Some of the quality of life domains have yielded low coefficients for internal consistency, but those have varied between the cited studies. The LQOLP has also been tested for validity in terms of differential item functioning (DIF) in patient groups with varying types of psychopathology and cognitive deficits. DIF was found on one item for patients with depression, who were less likely to rate satisfaction with life as a whole positively, and for one item regarding patients with severe general psychopathology, who were less likely to endorse the item about personal safety. No DIF was found for patients with cognitive deficits (Reininghaus et al., 2012). Regarding construct validity, the LQOLP has been shown to measure a construct other than, for example, psychopathology and social functioning.

Discussion

Several researchers have reviewed the LQOLP and found it relevant for use with psychiatric patients, also in comparison with other well-known quality of life scales. However, research generally indicates that quality of life instruments are not exchangeable, which must be considered when comparing results from studies based on different instruments. Nevertheless, a short form of the LQOLP exists, the Manchester Short Assessment of Quality of Life (MANSA), proposed to produce scores that may be regarded equivalent to those of the LQOLP. The psychometric properties of the MANSA are comparable to those of the original LQOLP form, and the correlation between the domain mean scores of the two versions has been shown to be 0.94 (Priebe, Huxley, Knight & Evans, 1999). The LQOLP has been in use for about 15 years and has been found reliable and valid in several contexts, also with patients with severe psychiatric conditions and cognitive deficits. This makes it one of the most suitable alternatives for assessing quality of life among people with a mental illness.

Cross-References

- ▶ Affect Balance Scale
- ▶ Cantril Self-Anchoring Striving Scale
- ▶ Cognitive Function
- ▶ Quality of Life (QOL)
- ▶ Self-Esteem

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Lancashire Quality of Life Profile (LQOLP)

► Methadone Treatment for Opiate-Dependent Persons

Lancashire Scale

► Lancashire Quality of Life Profile

Land Development Regulations

► Zoning

Land Quality Indicators

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Synonyms

LQI

Definition

> Land quality is the condition, state or "health" of the land relative to human requirements, including agricultural production, forestry, conservation, and environmental management. (Pieri, Dumanski, Hamblin, & Young, 1995)

Description

The core of this "land quality" definition has stood the test of time although at first glance it does have a very biophysical feel to it (Dumanski, 1997). But the linkage to human requirements is critical. Hence "quality" is meant in terms of usefulness of land to humans. Land quality indicators (LQIs) can be identified to make this definition of land quality operational. There are many LQIs that could be used, and some examples of LQI categories are as follows (after Dumanski, 1997):

1. *Nutrient balance*. A state indicator of the nutrient stocks and flows as related to different land management systems (Bindraban, Stoorvogel, Jansen, Vlaming, & Groot, 2000). The nutrient balances which relate to "good" land quality will depend upon many factors such as soil type.
2. *Yield trend over time and yield gap*. The latter is the ratio of actual to potential yield (Bindraban et al., 2000), and the larger the gap between actual and potential yield for any give soil type, crop, environment (e.g., rainfall), and management regime (e.g., plant density), then the poorer the land quality is assumed to be.
3. *Land-use intensity*. This is a pressure indicator which assesses the demands being made of land. It is assumed that the high the land-use intensity, then the greater the pressure being placed on the land. An example of such an indicator is "cultivation intensity" (R factor; Stocking, 1994).

$$\text{R factor} = ((\text{Seasons under cultivation})/(\text{Seasons under cultivation} + \text{seasons under fallow})) \times 100$$

The nearer this value is to 100 %, then the less fallow there is in the system. But determining an "acceptable" R factor depends upon a number of factors such as soil type, the type of crops grown, and the amount of fertilizer or organic matter added by the farmer. For example, in savannah areas with

a ferralsol or acrisol type of soil, a cropping period of between 120 and 269 days, and low levels of input, it has been suggested that 15 % is suggested as a minimum R factor for sustainable production. An R factor of 15 % corresponds to a relatively low cultivation intensity of 3 years under cultivation for every 20. However, studies have shown much higher R factors on similar types of soil. For example, Morse, McNamara, Acholo and Okwoli (2000) found R factors of between 32 % and 56 % in the middle belt of Nigeria.

4. *Land-use diversity (agrodiversity)*. This describes the degree of diversification of land-use systems over the landscape and is assumed to reflect resilience (ability to absorb economic, environmental, and social shocks). Thus, it is assumed that the more diverse the production systems, then the greater the resilience to such shocks.
5. *Land cover*. This is related to the exposure of soil to erosion. In general, the greater the extent of land cover by plants during the year, then the lower the potential for wind- and rain-mediated erosion. Plant leaves help to reduce the impact of rain on soil, and plant roots and organic matter help to bind the soil particles together.

Cross-References

- ▶ Land Use Diversity Index
- ▶ Land Use
- ▶ Landscape Development Intensity
- ▶ Land-Use Planning

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Land Use

▶ Zoning

Land Use Diversity Index

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Synonyms

LUDI

Description

Landscape has long been viewed as multifunctional, integrating ecological, economical, sociocultural, historical, and aesthetic dimensions rather than being one-dimensional physical entities of wood, water, and rock. For example, a set of landscape indicators designed to be applied in the EU is provided by Piorr (2003) and summarized in Table 1.

Themes 1, 2, and 3 are essentially physical measures of the landscape, what is in it in terms of land coverage, and how this has changed with time. Such information can be gleaned from aerial or satellite photographs allied with census records. The second category includes indicators such as measures of land-use diversity and fragmentation, while the third has an especial focus on certain types of "valued" habitat. Underlying these indicators is an assumption that diversity within a landscape is an important aspect

Land Use Diversity Index, Table 1 Some landscape indicators (adapted from Piorr 2003)

	Theme	Some example indicators
1	Landscape composition	Stock and change in types of land use such as arable land, grassland, forest, and built-up areas
2	Landscape configuration or structure	Measures of diversity, shape of land-use parcels, degree of fragmentation of the land-use types
3	Natural landscape features	Stock and change of seminatural, natural, and valuable habitats
4	Historical-cultural landscape features	Stock and change of historical-cultural features (area, length, number)
5	Landscape management, conservation, and protection	Change in financial expenditure on agri-environmental schemes and area covered by such schemes, area under specific farming practices, number of farmers taking part in training schemes related to environmental practice

which needs to be both assessed and managed. The land-use diversity index (LUDI) is a means by which items 1 and 2 in particular can be assessed. In theory, it should comprise a combination of the indicators listed for items 1 and 2 in Table 1, such as diversity in the types of land uses with the landscape (crops, forest, urban), the shape of these different parcels of land use and how fragmented they are, and the species richness within the parcels. One equation for estimating a LUDI which builds upon these assumptions has been provided by Yoshida and Tanaka (2005) and is summarized as follows:

$$LUDI = \frac{2m\sum_{j=1}^{m}\left(j.W_{cj}.\left[k_j - (k_j - 1)^2\frac{\sqrt{\pi}a_j}{p_j}\right].a_j\right)}{A(1+m)}$$

The equation is a complex one but breaks down into two components: numerator and denominator. In the denominator, m is the number of patch types present in a landscape unit, where each type is allocated a subscript (j) ranging from 1 to m. A is the total area of all the patch types in the landscape. Thus, the denominator is the product of landscape area by the number (+1) of patch types present in that landscape.

The numerator of the expression comprises the following components:

k_j is the upper limit of the structural weight of patch type j.

a_j is the area of patch type j.

p_j is the perimeter of patch type j.

W_{cj} is the species richness (W_c) of patch type j.

Thus, the numerator is a complex product of patch shape (combination of a_i and p_i) and species richness (W_{cj}) of the patches.

In the Yoshida and Tanaka (2005) equation, the greater the value of the LUDI, then the greater the land-use diversity.

Cross-References

- ▶ Land Quality Indicators
- ▶ Land Use
- ▶ Landscape Development Intensity

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Landscape and Quality of Life

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Synonyms

Outdoor environment

Definition

There are various definitions related to different professions and usages. The word itself comes from the Dutch *landskip*, used first to define a painting of a natural scenery; it was then used to refer to the scenery itself by John Milton in the seventeenth century (OED, Bourassa, 1991). Geographers have used the word landscape to define "an area made up of a distant association of forms, both physical and cultural" (Leighly, 1963, p 321) while the humanistic geographer Denis Cosgrove defines it as "the integration of natural and human phenomena which can be empirically verified and analysed by the methods of scientific enquiry over a delimited portion of the earth's surface" (1984, p. 9). Since 2000, the definition adopted by professionals and academics in the environmental studies and landscape design fields is the definition contained in the European Landscape Convention: "an area as perceived by people, whose character is the result of the action and interaction of natural and/or human factors."

Description

The current use of landscape by the environmental/landscape professionals and academics implies a close relationship between people and places. It is not the idea of landscape viewed by a detached observer but encompasses the subjective experience of the users within the landscape. This is confirmed by Gesler in developing the concept of therapeutic landscapes, who proposes that it is not only the result of human interaction with the environment but should be considered as "the product of the human mind, and of material circumstances" (1992, p. 743). Consequently, in the European Landscape Convention (Florence, 20th October 2000), landscape is acknowledged as being "an important part of the quality of life for people everywhere: in urban areas and in the countryside, in degraded areas as well as in areas of high quality, in areas recognized as being of outstanding beauty as well as everyday areas." In this way, the quality of landscape is instrumental in providing an environment which is more comfortable and offers a higher quality of life, especially in urban environments. However, the relationship between landscape and quality of life is complex and covers a multitude of topics, which cannot be dissociated from the overall contemporary concern of creating sustainable living environments. The three dimensions of sustainability – social, environmental, and economic – will therefore be used to try to summarize the various research projects and findings related to landscape and quality of life. Numerous research publications, which explore the link between landscape and quality of life, are often specifically related to physical and mental health. These touch upon a wide range of research fields including humanities and social science, environmental science and engineering, as well as economics.

Social Aspects

The social aspects of landscape can be subdivided into research related to health and well-being on one hand and social cohesion and inclusiveness on the other.

Health and Well-Being

The relationship between people's health and landscape is a recurrent theme through landscape history (Ward Thompson, 2011). However, this connection has been more intensively academically researched since the influential American publications in the field of environmental psychology of the 1970s and 1980s. Rachel Kaplan in "some psychological benefits of gardening" (1973) initiated the study related to the restorative effect of landscape, which was developed in following publications exploring which qualities of the landscape have more influence on people's satisfaction and happiness (Kaplan & Kaplan, 1989). Ulrich (1979), on the other hand, focuses on stress reduction and visual experience of landscape. He suggests that "the benefit of visual encounters with vegetation may be greatest for individuals experiencing stress or anxiety" (1986, p. 29). These publications have had a major impact on how landscape researchers and professionals view the relationship between natural elements, health, and well-being.

These early works were followed by numerous publications looking into the restorative effect of contact with nature, which Stephen Kaplan attempted to synthesize in "The restorative benefits of nature toward an integrated framework" (1995). In the UK, the OPENspace Research Centre has since 2001 specialized in the interaction between open spaces and people through various research projects and literature reviews (Morris, 2003; Bell et al., 2008).

The research exploring the health benefits of landscape has established some evidence of positive links between access and interaction with the natural world and people's physical and mental health (Bird, 2007; Ward Thompson et al., 2010). The benefits are even higher for children's cognitive, physical, and social development (Wells & Evans, 2003). High-quality landscape contributes to more active healthy lifestyles (De Vries, 2010) and can have therapeutic benefits (Gesler, 1992, Barton & Pretty, 2010). The emphasis of lots of studies in this field is qualitative research, but there are some attempts to identify hard evidence despite the subjective nature of people's perception and feelings toward landscape. For example, the Kaplan et al. (1998) made an attempt to develop guidance to inform future design and management while the OPENspace research group is working on what qualities of the landscape have more impact on people's quality of life (Bell et al., 2008; Ward Thompson et al., 2010). They are developing tools to measure objectively the interrelationship between landscape characteristics and people's behavior and feelings while others provide further evidence by undertaking an assessment of the length and quality of exposure to open spaces in relation to age group to achieve maximum benefits (Barton & Pretty, 2010). They concluded that benefits are more important from short engagements with open spaces and all "green" environments make people happier, but the most pronounced effects are achieved when water is available.

Social Cohesion and Inclusiveness

Landscape and, more specifically, public parks have always played an important social function. With the globalization of our society and increase in ethnic, cultural, and social differences, open spaces are nonthreatening areas or fora where people from various cultural and social backgrounds can meet and interact and where social activities are encouraged (Coley, Kuo, & Sullivan, 1997, Sullivan, Kuo, & DePooter, 2004). Social public open spaces can bring communities together, create place attachment, and provide a sense of place. The sense of ownership and belonging related to a place might have beneficial effect on behavior and prevent antisocial activities (Kuo & Sullivan, 2001). Spaces with vegetation may help people to cope with difficult social and economic circumstances, and outdoor environments offer also the possibility to cater for people's differences in abilities, desires, and needs and contribute to more inclusive living environments (Ravenscroft & Markwell, 2000).

Environment

Environmental and ecological values are widely accepted to be intrinsic to landscape. This implies that with climate change and its consequences, which have raised concerns about the future qualities of living environments, landscape has an instrumental role to play to alleviate the consequences of potential rises in pollution, temperatures, and effects of natural risks as well providing habitats to preserve and encourage the diversity of natural species. While in rural settings the emphasis is on nature conservation and preservation, a lot of research projects focus on urban environments where the impact of climate change on the quality of life will be more severe. However, environmental benefits cannot be limited to a geographical area as they relate to elements such as air, water, fauna, and flora, which cannot be contained. Similarly, it is not possible to dissociate natural and human habitats as they are interconnected, and natural environmental concerns are in fact more valued when related to people and their perception of places. Hough (1995) in *Cities and Natural Processes* provides a good summary of the potential mitigating effects of landscape on providing higher quality living environments, but others also examine the various aspects of landscape to

create sustainable cities (Barton, Davies, & Guise, 1995) and healthy communities. The environmental benefits of landscape related to the quality of life can be subdivided into two themes: enhancing human comfort and increase biodiversity.

Human Comfort

This includes absorption of atmospheric pollutants, air cooling, and flood risk minimization. Trees in particular are instrumental in improving our urban comfort. Large woodland trees can absorb CO_2 and reduce pollution (Bolund & Hunhammar, 1999) while street trees can contribute to reducing the urban heat island effect and mitigate the wind tunnel effect. Climatic comfort is also related to air flow, which is facilitated by open spaces (Gill, Handley, Ennos, & Pauleit, 2007). River corridors, which form continuous greenways through landscapes and urban environments, can also contribute to cooling the built environment. Water is one of the most important components of landscape, and integrated urban water management is essential to reduce risks of flooding. This is fully dependent on the affordance of open spaces to provide possibilities of water absorption and retention with vegetation being instrumental in intercepting storm water (Bolund & Hunhammar, 1999). Landscape also plays an important role in the visual quality of places, and vegetation can help screen the visual impact of traffic and reduce the perception of noise (Bolund & Hunhammar, 1999).

Biodiversity

Preserving the diversity of the natural environment is part of sustainable living, and the "biophilia" hypothesis is built upon the assumption of "the innately emotional affiliation of human beings to other living organisms" (Willson, 1984, p. 31). This important link between contact with nature and well-being is confirmed by one of the key findings of the recent DEFRA (Department for the Environment Food and Rural Affairs) National Statistics Publication: *Attitudes and knowledge relating to biodiversity and the natural environment, 2007–2011;* it states that 92 % of respondents indicated that it was important to have open spaces nearby with a majority worrying about the loss of animals and plants in the world. Landscapes with a wide range of vegetation provide diverse habitats and therefore promote biodiversity. However, the level of biodiversity depends on a large number of factors, including the diversity of habitat types, forms, and their level of connectivity with other habitats. The value of open spaces to encourage wildlife is not intrinsic to their size and location (Tratalos, Fuller, Warren, Davies, & Gaston, 2007). For example, private gardens with their wide variety of plants create high-quality biodiverse environments (Fuller, Irvine, Devine-Wright, Warren, & Gaston, 2007), and brownfield sites in urban areas offer more opportunity for wildlife than the intensively cultivated agricultural countryside.

Economic

Landscape is an amenity which is highly valued, especially in the built environment. The quality of people's experience and popularity of places are proportional to the quality of the landscape. People are expected to be attracted and feel happier in safe, well-maintained, and aesthetically pleasing environments. However, these qualities are not quantifiable, and therefore it is difficult to provide evidence of the economic value of landscape. Economic criteria fail to consider the wide range of functions and benefits mentioned above, which cannot always be quantified in direct monitory terms. There is a commonly accepted assumption that higher quality landscape generates higher property prices and investments, influences business location, positively affects productivity, and contributes to reduced absenteeism (Kaplan, 1993). But hard evidence of this is thin on the ground. There is some evidence that contribute to higher house prices (Luttik, 2000), but *Does Money Grow on Trees?* (2005) published by the UK's now-defunct Commission of Architecture and Built Environment (CABE) identified the lack of availability of robust, statistically significant data to assess the economic value of landscape. However, the recreational value of open spaces is

unquestionable and essential to daily life to create high-quality living, working, and commercial environments. Therefore, even if it is difficult to prove a monetary value of high-quality landscapes, there is evidence that it provides physical capital, which projects a positive image and boosts people's confidence.

Discussion

Access to "nature" and outdoor spaces is a necessity to humankind, and there is consensus that there is a direct relationship between landscape quality and quality of life. The beneficial aspects of landscape are numerous and diverse, as discussed above, but there is a need to better understand what qualities of the landscape have more influence on people's life and happiness. Furthermore, landscape-related research relies heavily on qualitative data rather than hard evidence. This explains partly why whenever developments rely on private investment and financial gain, rather than public interest, landscape quality is not a priority. Landscapes have always offered opportunities for human habitats and refuge, but the harmony between human life, its need and uses, and the environment in which it is lived is a fragile balance which can easily be compromised. It is therefore important to consider all the aspects related to the actions and interactions of natural and human factors to provide living places that offer high quality of life for all. These different aspects relate to each other and sometimes overlap. There is a need for cross-disciplinary research to study the interactions and dynamics between the wide range of topics related to landscape and quality of life. The subjective nature of landscape perception and experience calls for more robust evidence distinguishing specific needs in relation to age group, cultural and social backgrounds, and needs, as well as environmental changes.

Cross-References

- ▶ Built Environment
- ▶ Outdoor Environment
- ▶ Quality of Place
- ▶ Sustainability
- ▶ Sustainable Urban Design
- ▶ Urban Design

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Landscape Development Intensity

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Synonyms

LDI

Description

Land use intensity is referred to all types of land uses, agriculture, pastures, forests, etc. and is related to the mechanization, number of animals, yield, etc. On the other hand, land disturbance usually implies human-induced changes on land systems. Measuring land disturbance can be generic and simple in its conceptualization. For example, the amount of land converted from a seminatural to a human-dominated land use (e.g., urban, agric) or more specific (to the type of disturbance) and mathematical, e.g., road-related metrics measuring landscape fragmentation following road construction (Jaeger, 2000). The concept of land disturbance is also integrated into the ecological footprint index where land disturbance is expressed in terms of "disturbed hectares," calculated from actual areas by weighting with factors describing the degree of disturbance (Lenzen & Murray, 2001). The concept of landscape development index (LDI) was proposed by Brown and Vivas (2005) who devised a quantitative methodology to evaluate the human disturbance gradient that is applicable to landscapes of varying scales, from watersheds to forest patches or isolated wetlands. Methodologically this involves four main steps:

1. Delineation of area of influence
2. Characterization of land uses
3. Quantifying human-development intensity by land use
4. Calculating and area-weighted LDI

Area of influence is the spatial extent of the analysis, usually the watershed or drainage basin surrounding the features of interest, e.g., a forest,

Landscape Development Intensity, Table 1 Summary of typical landscape development intensity (LDI) coefficients (after Cohen, Carstenn, & Lane, 2004)

LDI coefficient	Land use
1–2	Upland forest or wetland
2.5–3	Pine plantation
3–4	Rangeland
4–5	Woodland pasture
6	Field and citrus crops
7–8	Intensive improved pasture
9	Row crops
10	Feedlots and dairy operations

Note: Within each land use category, site-specific considerations (stocking rates, logging rotation times, evidence of recent changes in prevailing land use, fire history, etc.) were used to designate how a site was rated

stream, and wetland. The various land uses for the area of influence are derived from existing maps, aerial photographs, and/or field surveys. The land uses within the "area of influence" are each assigned an LDI coefficient (see Table 1), and then a "total" LDI value is calculated as an area-weighted average. The LDI scores are computed using land use and land cover maps within a GIS using the following formula:

$$\text{LDI total} = \Sigma\%\text{LUi}\cdot\text{LDIi} \quad (1)$$

where

LDI total = LDI ranking for landscape unit

%LUi = percent of the total area of influence in land use i

LDIi = landscape development intensity coefficient for land use i

LD intensity measures the human disturbance gradient and differs from other measures of land use intensity because it scales the intensity of activity based on nonrenewable energy use, a characteristic common to all human-dominated land uses. The derivation of the coefficients used is based on emergy use per unit area per time. Emergy is the availability of energy of one kind that is used up in transformations directly and indirectly to make a product or service (Odum, 1996). LDI coefficients for each land use range from 1 for natural areas to 10 for high-intensity agricultural operations (see Table 1). The more developed a landscape, then the greater the intensity of impacts.

Landscape Development Intensity, Table 2 LDI calculation for an agricultural landscape

Land use	Coefficient	% of total area	LDI
Upland forest or wetland	2	50 (0.5)	1
Rangeland	4	30 (0.3)	1.2
Field and citrus crops	6	20 (0.2)	1.2
		Total LDI	3.4

Landscape Development Intensity, Table 3 LDI calculation for a forest landscape

Land use	Coefficient	% of total area	LDI
Upland forest or wetland	2	20 (0.2)	0.4
Rangeland	4	30 (0.3)	1.2
Field and citrus crops	6	50 (0.5)	3.0
		Total LDI	4.6

Below is an example calculation of the LDI for two contrasting landscapes, an agriculture-dominated and a forest-dominated landscape (Tables 2 and 3, respectively). The coefficients used follow Table 1.

Cross-References

- Land Use
- Land-Use Planning

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Land-Use Planning

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Synonyms

City planning; Environmental planning; Local planning; Physical planning; Regional planning; Town and country planning; Urban planning

Definition

Land-use planning is one of a number of terms (e.g., town planning, town and country planning, urban planning, city planning, environmental planning) commonly used to cover public policy intervention related to the ordering and regulation of land use in an efficient, sustainable, and ethical way. There are numerous academic- and practice-based definitions of spatial planning, and these are, to some extent, context specific, varying between different countries and jurisdictions. Indeed, it has been commented that the meaning of the term "land-use planning" still remains vague. There have, nonetheless, been many definitions put forward over the years related to the land-use planning concept. Traditional definitions tend to emphasize planning as a systematic process with the aim of regulating the future use and development of land.

Description

Land-use planning is one of a number of terms (e.g., town planning, town and country planning, urban planning, city planning, environmental planning) commonly used to cover public policy intervention related to the ordering and regulation of land use in an efficient, sustainable, and ethical way. There are numerous academic- and practice-based definitions of spatial planning, and these are, to some extent, context specific, varying between different countries and jurisdictions. Indeed, in a recent historical review of the concept of land-use planning in an American context (Akimoto, 2009), it is commented that the meaning of the term "land-use planning" still remains vague. There have, nonetheless, been many definitions put forward over the years related to the land-use planning concept. In (Dror, 1963) the emphasis is on the process, with planning seen as "*. . . the process of preparing a set of decisions for action in the future directed at achieving goals by optimal means*."

Such concepts imply a systematic process encompassing stages of survey, analysis, and evaluation of alternative strategies against defined goals and/or future visions of the area or place which date back to early town planning pioneers such as Patrick Geddes and Louis Mumford. Today, planning is defined by the American Planning Association as "*. . .a dynamic profession that works to improve the welfare of people and their communities by creating more convenient, equitable, healthful, efficient, and attractive places for present and future generations*."

Land-use planning's traditional focus on the regulation and future development of land is reflected in a traditional definition (Keeble, 1969) that "*. . .* (Town planning) *is the art and the science of ordering the land-uses and siting the buildings and communication routes so as to secure the maximum level of economy, convenience and beauty*."

The regulatory form of land-use planning is often equated with the concept of zoning whereby legal regulations are drawn up regarding allowed land uses and development characteristics on identified areas of land. Planning systems based around zoning regulations are common in many

parts of the world including the USA, Canada, Australia, and much of continental Europe. However, land-use planning systems based on more discretionary approaches to plan-making, whereby the plan is used as a guide but not a legal blueprint to what might or might not be allowed, have a long-standing tradition in a UK context.

Thus, other definitions of planning emphasize broader issues around improving environmental conditions and quality of life. In (Healey, 2010) planning is described as an activity which "*. . . responds to people's concerns about improving the conditions of life and about reducing the environmental stress that human activity generates, especially in the crowded conditions of urban living*." Recent literature, especially in North West Europe, has tended to distinguish between the concept of land-use planning and spatial planning. The former is seen as a more traditional emphasis on the physical use and regulation of land while the latter is usually seen as a broader concept, integrating the spatial aspects and consequences of a wide range of economic, social, and environmental factors at different spatial scales. In essence (Cullingworth & Nadin, 2006), "*. . .physical land use planning describes government action to regulate development and land uses in pursuit of agreed objectives. . .*" while "*. . .spatial planning in the European sense is more centrally concerned with the problem of coordination or integration of the spatial dimension of sectoral policies through a territorially based strategy*."

Taking this further, in (Nadin, 2006, 2007) the predominant characteristics of land-use and spatial planning are compared (see entry for "► Spatial Planning (Europe)" for more details), although it is acknowledged that these are "ideal" types and that most planning systems will be a combination of the two.

Cross-References

► Spatial Planning (Europe)

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Laparoscopic Cholecystectomy

► Symptomatic Gallstone Disease and Quality of Life in Taiwan

Large Congregate Care

► Care, Residential

Lassitude

► Fatigue

Last Frontier, Alaska

► Alaska, Living Conditions of the Inupiat

Late-Life Adaptation

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Definition

Late-life adaptation can be defined as a process that allows older people to cope with unwanted changes and transient or persistent losses which accumulate with increasing age and therefore make high demands on adaptation. There is no ultimate criterion for successful late-life adaptation, but subjective quality of life plays a decisive role.

Description

Characteristics of Late Life

Late life is the last period in the life course, and retirement is generally considered as the starting point of this phase of life. Late life is characterized by an increasingly unfavorable ratio of developmental gains and losses. Developmental gains such as growth in serenity, integrity, and wisdom are confronted with increasing challenges in a variety of life domains. In old age, pivotal resources such as health and social relationships are increasingly jeopardized or impaired. However, despite a higher prevalence of losses, many older individuals report high life satisfaction. This phenomenon is also known as "paradox of subjective well-being."

Challenges of Late Life

Characterizing late life by challenges and losses is a very broad-brush depiction of this phase of life and may reiterate negative stereotypes of old age. Hence, it is important to emphasize two basic propositions of gerontological research. First, interindividual differences increase in late life, that is, two older people of the same age differ more strongly from each than is the case for younger people. "Typical" life events in this phase of life mark the developmental trajectories of many, but not all older individuals. Secondly, although developmental losses become more prevalent in the second half of life, developmental gains continue to be important. These reservations should be kept in mind when sketching challenges of late life.

Retirement is usually considered as a transition into late life. This transition does not only imply an increase in some resources, such as time resources ("late freedom"), but can also come along with a decrease of other resources, such as lower income (old-age pension). Rising incidence of (chronic) diseases can be already observed in middle adulthood. However, particularly in the so-called fourth age (after the age of 80–85 years), the probability of functional and cognitive impairments, frailty, and need for help and long-term care increase remarkably. Health-related losses have a tremendous impact on older people's daily life. This means that aging individuals confronted with deteriorating health have to adapt to the consequences of chronic illnesses and functional impediments. Aging individuals are embedded in social convoys – which are changing over time as well. Network partners are getting older and may die. A fundamental social loss is the experience of ▶ widowhood. Widows and widowers have to cope with the loss of their closest partner. Also friends, siblings, and long-time neighbors might leave the network of a person. Finally, the person him or herself is confronted with a shrinking future time horizon.

Taken together, older people are often faced with multiple challenges they have to adapt to. Hence, late-life adaptation is one of the central topics of aging research. What does ▶ adaptation in late life mean, and how is adaptation in late life possible, considering the fact that age-related losses often affect resources necessary for coping with challenges?

Models of Late-Life Adaptation

Adaptation can be defined as a developmental process which supports an individual in coping

with a challenge or a change in his or her environment. Criteria for successful adaptation are manifold: longevity (survival), functional abilities, or subjective ▶ quality of life (e.g., life satisfaction). Selection of adaptation criteria depends on the theoretical or value framework of a given research or practical setting. Depending on the outcome criterion chosen, adaptive processes enhancing longevity may differ from adaptive processes protecting subjective quality of life. In the following paragraphs, we will describe (a) general models of stress and coping and (b) gerontological models of developmental regulation.

General Models of Stress and Coping

A modern version of a general ▶ stress-and-coping model is the "conservation of resources theory" (COR, Hobfoll, 2001). Central to people's ability to act are psychological, social, and financial resources. Stress occurs when resources are threatened or lost. Central to protect resources is the investment of resources. The theory proposes that "people must invest resources in order to protect against resource loss, recover from losses, and gain resources" (Hobfoll, 2001, p. 349). As aging is tightly connected to losing resources, those individuals who are well equipped with resources will cope better with the challenges of aging than individuals with fewer resources. Highly important in coping with challenges are psychological resources. The "broaden-and-build" theory (Fredrickson, 1998) holds that psychological resources like positive emotions widen repertoires of imagination and action by allowing the individual to explore the world, to practice skills, and to strengthen social bonds. Well-being fosters psychological resources that prospectively contribute to successful adaptation.

Another theoretical strand which helps to explain the generally high levels of subjective quality of life in old age is the work on ▶ resilience. In contrast to recovery (i.e., gradually returning to pre-event levels of quality of life), resilience "pertains to the ability of adults . . . who are exposed to an isolated and potentially highly disruptive event, such as the death of a close relation or a violent or life-threatening situation, to maintain relatively stable, healthy levels of psychological and physical functioning" (Bonanno, 2004, p.20). Apparently, a great number of individuals seem to be highly resilient even when facing extreme events. The same can be said about the adaptive capacities of aging individuals.

However, one question remains unresolved: Which psychological mechanisms enable resilience in the face of age-related adversity? A first answer – and a link to gerontological models – can be found in response shift theory. Individuals use a range of cognitive mechanisms to adapt to changing circumstances. ▶ Response shift refers to a change in the meaning of one's evaluation as a result of a change in internal standards of comparison, a change in values, or a change in the definition of the construct to be evaluated (Sprangers & Schwartz, 1999). Hence, an important mechanism in adapting to age-related challenges is changes in the reference system of the individual.

Gerontological Models of Developmental Regulation

In the last 30 years, aging research has seen the emergence of a variety of models which are of central relevance to the topic of late-life adaptation. A typical example for these gerontological models is the "dual process model of developmental regulation" (Brandtstädter, 2009). Individuals attempt to regulate their personal development. In late life, they struggle to obtain a favorable balance of gains and losses. Two processes are important in this respect: On the one hand, individuals try to change the world according to their goals (tenacious goal pursuit), and on the other hand – and with advancing age increasingly so – individuals may be ready to adjust goals and ambitions to a changing world (flexible goal adjustment). Balancing these processes protects subjective life quality over the life course. Similarly, the model of selection, optimization, and compensation (SOC) specifies three processes for successful development, namely,

(a) the selection of developmental domains, (b) the optimization of developmental potential, and (c) the compensation for losses, ensuring the maintenance of functioning (Baltes & Baltes, 1990).

With respect to social integration, the socioemotional selectivity theory maintains that with advancing age individuals become increasingly selective, investing greater resources in emotionally meaningful goals and activities (Carstensen, Mikels, & Mather, 2006). However, not age per se, but individually shrinking time horizons lead to shifts in motivation. While younger individuals (with a wider time horizon) prefer novel people and situations, older individuals (with a narrower time horizon) prefer positive and comforting situations (also called the "positivity effect" of old age).

Outlook

Old age is characterized by a variety of losses, which do not affect every person growing old but are inevitable challenges for many. Adaptation to challenges occurring in late life might be analyzed by general models of stress and coping. However, the readiness to change the frame of reference may be typical for old age. Changing frameworks may be especially protective for maintaining high levels of subjective quality of life (e.g., life satisfaction). Central to successful late-life adaptation is the integrated use of different adaptation processes, adding to many, healthy years a high subjective quality of life.

Cross-References

- ▶ Resilience
- ▶ Stress
- ▶ Stressful Life Events

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Late-Life Marriage

▶ Older Couples

Latent Class Analysis

▶ Latent Class Model

Latent Class Cluster Analysis

▶ Latent Class Model

Latent Class Factor Analysis

▶ Latent Class Model

Latent Class Model

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Synonyms

Finite mixture model; Latent class analysis; Latent class cluster analysis; Latent class factor analysis; Latent profile analysis; Mixture growth model; Mixture model; Mixture regression analysis; Model-based clustering

Definition

A statistical model is called a latent class (LC) or mixture model if it assumes that some of its parameters differ across unobserved subgroups, latent classes, or mixture components. This rather general idea has several seemingly unrelated applications, the most important of which are clustering, scaling, density estimation, and random-effects modeling. It should be noted that in applied fields the terms LC model and mixture model are often used interchangeably, which is also what I will do here. In the more technical statistical literature on mixture modeling, the term LC analysis is reserved for a specific type of mixture model, that is, a mixture model for a set of categorical items (for the classical LC model).

LC analysis was introduced in 1950 by Lazarsfeld as a tool for building typologies (or clustering) based on dichotomous observed variables (Lazarsfeld, 1950). More than 20 years later, Goodman (1974) made this model applicable in practice by developing an algorithm for obtaining maximum likelihood estimates of the model parameters as well as proposed extensions for polytomous manifest variables and did important work on the issue of model identification. Many extensions of this classical LC model have been proposed since then, such as models containing explanatory variables (Dayton & Macready, 1988), models that relax the local independence assumption (Hagenaars, 1988), constrained models similar to IRT models (Heinen, 1996; Lindsay, Clogg, & Grego, 1991), models with multiple latent variables (Magidson & Vermunt, 2001), models for longitudinal data (Van de Pol & Langeheine, 1990), and models for multilevel data (Vermunt, 2003).

Whereas the classical LC model and its extensions are conceived primarily as clustering and scaling tools for categorical data analysis, LC and finite mixture models can be useful in several other application areas as well. One area is probabilistic cluster analysis for continuous observed variables, an approach that offers many advantages over traditional cluster techniques such as K-means clustering (McLachlan & Peel, 2000; Vermunt & Magidson, 2002). Another application area is dealing with unobserved heterogeneity, as happens in mixture regression analysis of multilevel or repeated measurement data (Vermunt & Van Dijk, 2001; Wedel & DeSarbo, 1994).

Description

Simple Latent Class and Mixture Models

The classical LC model is used as a clustering tool for categorical variables. Table 1 presents a small illustrative data set consisting of three dichotomous items from a hypothetical QoL questionnaire, asking whether the respondent experiences problems (no/yes) with three types of activities. The column "Frequency Count" shows the number of respondents for each of the eight possible answer patterns. The aim of an LC analysis of the data set in Table 1 could be to classify respondents into one of two groups or latent classes: a group with few and a group with many problems. The results obtained with the 2-class latent class model are reported in Table 2. Class 1 is larger than class 2 (the class proportions equal .601 and .399, respectively) and is more likely to have each of the three problems than class 2.

LC analysis defines a model for the probability of having a particular response pattern. In the above example this is the probability of

Latent Class Model, Table 1 An illustrative data set with three dichotomous responses

Problem 1	Problem 2	Problem 3	Frequency count	Proportions for class 1	Proportions for class 2	Overall proportions	Posterior probability for class 1	Posterior probability for class 2	Modal class
no	no	no	239	0.004	0.272	0.111	0.020	0.980	2
no	no	yes	101	0.010	0.102	0.047	0.128	0.872	2
no	yes	no	283	0.038	0.271	0.131	0.175	0.825	2
no	yes	yes	222	0.104	0.102	0.103	0.605	0.395	1
yes	no	no	105	0.020	0.092	0.049	0.248	0.753	2
yes	no	yes	100	0.054	0.035	0.046	0.703	0.297	1
yes	yes	no	348	0.208	0.091	0.161	0.774	0.226	1
yes	yes	yes	758	0.562	0.034	0.352	0.961	0.039	1

Latent Class Model, Table 2 Class profiles (class proportions and probability of having a problem) obtained with 2-class model for data in Table 1

	Class 1	Class 2
Class proportion	0.601	0.399
Problem 1 = yes	0.844	0.252
Problem 2 = yes	0.912	0.499
Problem 3 = yes	0.730	0.273

answering the items according to one of the eight possible response patterns, for example, of having problems with the first two activities and no problems with the last one, which as can be seen in Table 1 equals .161 for the estimated 2-class model. The first basic assumption of the LC model is that this probability is a weighted average (or mixture) of the class-specific probabilities for these patterns. For example, the number .161 is obtained as .601 × .208 + .399 × .091. As can be seen from the class-specific probabilities for the eight answer patterns reported in Table 1, latent class 1 has higher probabilities for the response patterns with 2 or 3 problems, whereas class 2 has higher probabilities for the response patterns with no or one problem. What we observe for the total sample is a mixture of these two groups.

The classical LC model combines the mixture model assumption with the assumption of local independence, which means that the item responses are mutually independent given a subject's class membership. As reported in Table 2, for a subject belonging to the first LC, the class-specific probability of having a problem equals .844, .912, and .730 for items 1, 2, and 3, respectively. The local independence assumption implies, for example, that the probability of having only the first two problems for someone in LC one equals .844 × .912× (1-.730) = .208. Note that the local independence assumption is also used in other types of latent variables models, such as in factor analysis and IRT modeling, and is thus not specific for LC analysis.

It is important to note that LC models can not only be used with categorical responses but also with counts and with continuous responses. The class-specific distributions could be binomial, Poisson, or negative binomial distributions for counts and normal or gamma distributions for continuous responses. The mixture model for continuous response variables is sometimes referred to as the latent profile model. The parameters of this model are the class proportions and class-specific item means and variances.

Similar to cluster analysis, one may wish to assign individuals to LCs. The probability of belonging to a particular LC given the responses – often referred to as posterior class membership probability – can be obtained by the Bayes' rule. Table 1 reports the class membership probabilities for each answer pattern. It equals, for example, .774 for the (yes,yes,no) pattern, which is obtained as .601 × .208/.161. The most common classification rule is modal assignment, which amounts to assigning each individual to the LC with the highest probability. The last column of Table 1 reporting the modal assignments shows that individuals with at least two problems are assigned to class 1 and the others to class 2.

Restricted Latent Class Models

Various interesting types of restricted LC models for categorical items can be obtained by imposing (linear) constraints on either conditional probabilities or logit coefficients. One type is the probabilistic Guttman scaling models for dichotomous responses, which are LC models with one latent class for each possible sum score. The idea is that apart from measurement error, class k should provide a positive answer to the k-1 easiest items and a negative answer to the remaining items. The simplest and most restricted model is the Proctor (1970) model. Table 3 presents the parameter estimates obtained when fitting the Proctor model to the data set in Table 1. As can be seen, the probability of a problem is either .833 or .167 = 1-.833. The measurement error – or the probability of giving a response which is not in agreement with the class – is estimated to be equal to .167. Whereas the Proctor model assumes that the measurement error is constant across items and classes, less restricted models can be defined which allow the error probabilities to differ across items, classes, or both (see, e.g., Dayton, 1999).

Latent Class Model, Table 3 Class profiles (class proportions and probability of having a problem) obtained with Proctor model for data in Table 1

	Class 1	Class 2	Class 3	Class 4
Class proportion	0.160	0.155	0.126	0.559
Problem 1 = yes	0.167	0.833	0.833	0.833
Problem 2 = yes	0.167	0.167	0.833	0.833
Problem 3 = yes	0.167	0.167	0.167	0.833

Croon (1990) proposed a restricted LC model that similar to nonparametric IRT assumes monotonic item response functions across classes. A more restricted version involves assuming double monotony, which means that not only the classes but also the items are ordered. Vermunt (2001) discussed various generalizations of these models.

Various authors described the connection between restricted LC analysis and parametric IRT modeling (see, e.g., Heinen, 1996; Lindsay, Clogg, & Grego, 1991); that is, IRT models with a discrete specification of the distribution of the underlying trait or ability can be defined as LC models with restrictions on the logistic parameters. This requires parameterizing the class-specific response probabilities using logit models with intercept and slope parameters. The key restriction is that LCs are located, representing the possible values of the discretized latent trait. These locations may be fixed a priori, for example, at −2, –1, 0, 1, and 2 in the case of five latent classes, but may also be treated as free parameters to be estimated. Depending on whether the items are dichotomous, ordinal, or nominal, this yields a 2-parameter logistic, generalized partial credit, or nominal response model. Further restrictions involve equating slopes across items, yielding Rasch and partial credit models, and imposing across category and across item restrictions on intercept parameters as in rating scale models for ordinal items.

Latent Class Models with Explanatory Variables

The most important extension of the LC models discussed so far is the possibility to include explanatory variables affecting the responses (Wedel & DeSarbo, 1994) or the class memberships (Dayton & Macready, 1988). LC models with explanatory variables in the model for the responses are, in fact, regression models for two-level data sets, where regression parameters are allowed to differ across LCs (of higher-level units). For example, the response could be the QoL score of a patient of a particular hospital. A mixture regression model would identify LCs of hospitals with different intercepts and different effects of patient characteristics on the QoL scores. Another possible application is in the analysis of longitudinal data, yielding a LC growth model in which subjects are grouped based on their developmental trajectories (Vermunt, 2007). In fact, in each of these application types, the LC model is used as a random-effects model without parametric assumptions about the distribution of the random effects (Aitkin, 1999; Vermunt & Van Dijk, 2001).

Also an individual's class membership may be predicted using covariates. This is achieved by defining a multinomial logistic regression model for the prior class membership probabilities. Strongly related is the simultaneous LC analysis across groups, which can be defined by using the grouping variable as a nominal explanatory variable in the model.

Other Extensions

The most common model-fitting strategy in LC analysis is to increase the number of classes until the local independence assumption holds. This may, however, yield solutions which are difficult to interpret. One alternative approach is to relax the local independence assumption by allowing for associations between particular item pairs. Hagenaars (1988) showed how to define LC models with local dependencies for categorical responses. With continuous responses this is easily achieved by using multivariate instead of univariate normal distributions for locally dependent items (see, e.g., McLachlan & Peel, 2000, and Vermunt & Magidson, 2002).

Another alternative strategy involves increasing the number of discrete latent variables instead of the number of LCs, which is especially useful if the items measure several dimensions. This so-called discrete factor modeling approach

(Magidson & Vermunt, 2001) is a special case of the path modeling approach for discrete latent variables developed by Hagenaars (1990) and Vermunt (1997a). Many other interesting models can be defined within this framework, such as latent Markov models for the analysis of longitudinal data (Van de Pol & Langeheine, 1990).

Recently models have been developed that contain both discrete and continuous latent variables. Examples of these are mixture factor models (Yung, 1997; McLachlan & Peel, 2000), mixture structural equation models (Dolan & Van der Maas, 1997), and mixture IRT models (Rost, 1990).

A recent extension is the multilevel LC model (Vermunt, 2003). One of its variants is a model with discrete latent variables at multiple levels of a hierarchical structure: for example, patients belong to LCs with different problems, and hospitals belong to LCs with different distributions of patients across the patient-level problem classes. Multilevel LC models can be used for the analysis of two-level multivariate and three-level univariate response data.

Maximum Likelihood Estimation

The parameters of LC models are usually estimated by means of maximum likelihood (ML). With categorical responses, one will typically construct a likelihood based on grouped data, as the one of Table 1. The most popular methods for solving the ML estimation problem are the expectation-maximization (EM) and Newton–Raphson (NR) algorithms. EM is a very stable iterative method for ML estimation with incomplete data. NR is a faster procedure that, however, needs good starting values to converge. The latter method makes use of the matrix of second-order derivatives of the log-likelihood function, which is also needed for obtaining standard errors of the model parameters.

One of the problems in the estimation of LC models for discrete responses is that model parameters may be nonidentified, even if the number of degrees of freedom – the number of independent cells in the cross tabulation minus the number of free parameters – is larger or equal to zero. Nonidentification means that different sets of parameter values yield the same maximum of the log-likelihood function or, worded differently, that there is no unique set of parameter estimates. The formal identification check is via the Jacobian matrix (matrix of first derivatives of the probabilities of the response patterns), which should be column full rank (Goodman, 1974). Another option is to estimate the model of interest with different sets of starting values. Except for local solutions (see below), an identified model gives the same final estimates for each set of the starting values. Although there are no general rules with respect to the identification of LC models, it is possible to provide certain minimal requirements and point to possible pitfalls. For an unrestricted LC analysis, one needs at least three responses per individual, but if these are dichotomous, no more than two LCs can be identified. One has to watch out with four dichotomous response variables, in which case the unrestricted three-class model is not identified, even though it has a positive number of degrees of freedom. With five dichotomous items, however, even a five-class model is identified. Usually, it is possible to achieve identification by constraining certain model parameters.

A second problem associated with the estimation of LC models is the presence of local maxima. The log-likelihood function of a LC model is not always concave, which means that hill-climbing algorithms may converge to a different maximum depending on the starting values. Usually, we are looking for the global maximum. The best way to proceed is, therefore, to estimate the model with different sets of random starting values. Typically, several sets converge to the same highest log-likelihood value, which can then be assumed to be the ML solution. Some software packages have automated the use of multiple sets of random starting values to reduce the probability of getting a local solution.

Another problem in LC modeling is the occurrence of boundary solutions, which are probabilities equal to 0 (or 1) or logit parameters equal to minus (or plus) infinity. These may cause numerical problems in the estimation algorithms, occurrence of local solutions, and complications in the computation of standard errors and number of

degrees of freedom of the goodness-of-fit tests. Boundary solutions can be prevented by imposing constraints or by taking into account other kinds of prior information on the model parameters.

Model Selection

The goodness of fit of LC models for categorical responses can be tested using Pearson and likelihood-ratio chi-squared tests. As in log-linear analysis, the number of degrees of freedom equals the number of cells in the frequency table minus 1 and minus the number of independent parameters. Although it is not a problem to estimate LC models with 10, 20, or 50 indicators, in such cases, the frequency table may become very sparse, and, as a result, asymptotic *p*-values can no longer be trusted. An elegant but somewhat time-consuming solution to this problem is to estimate the *p*-values by parametric bootstrapping. Another option is to assess model fit in lower order marginal tables (e.g., in the two-way marginal tables).

Even though models with K and $K + 1$ classes are nested, one cannot test them against each other using a standard likelihood-ratio test because it does not have an asymptotic chi-squared distribution. A way out to this problem is to approximate its sampling distribution using bootstrapping. But since this method is computationally demanding, usually alternative methods are used for comparing models with different numbers of classes. One popular method is the use of information criteria such as the Bayesian information criterion (BIC) and Akaike information criterion (AIC). Another more descriptive method is a measure for the proportion of total association accounted for by a K class model, $[L^2(1)\text{-}L^2(K)]/L^2(1)$, where the L^2 value of the one-class (independence) model, $L^2(1)$, is used as a measure of total association in the multiway-way frequency table.

Usually, we are not only interested in goodness of fit but also in the performance of the modal classification rule. Classification error reduction measures have been proposed based on entropy and qualitative variance. The closer these are to 1, the better the classification performance.

Computer Programs

One of the first LC analysis programs, MLLSA, made available by Clifford Clogg in 1977, was limited to a relatively small number of nominal variables (Clogg, 1977). Today's programs can handle many more variables, as well as other scale types. For example, Vermunt's LEM program provides a command language that can be used to specify a large variety of models for categorical data, including LC models (Vermunt, 1997b). Mplus (Muthén & Muthén, 2006) is a command language-based structural equation modeling package that implements many types of LC and mixture models. In addition, user-written routines for the estimation of specific types of LC models are available for SAS, R, and Stata.

Latent GOLD (Vermunt & Magidson, 2005) is a program that was especially developed for LC analysis and which contains both an SPSS-like point-and-click user interface and a syntax language. It implements all important types of LC models, such as models for response variables of different scale types, restricted LC models, models with predictors, models with local dependencies, models with multiple discrete latent variables, LC path models, LC Markov models, mixture factor analysis and IRT, and multilevel LC models, as well as features for dealing with partially missing data, for performing bootstrapping, and for dealing with complex samples.

Cross-References

- Factor Analysis
- Item Response Theory [IRT]
- Latent Growth Curve Modeling
- Latent Variables
- Logistic Regression
- Longitudinal Data Analysis
- Missing Data
- Multilevel Analysis
- Quality of Life Questionnaire

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Latent Curve Analysis

▶ Latent Growth Curve Modeling

Latent Growth Curve Modeling

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Synonyms

Latent curve analysis; Latent trajectory models; Structural equation models

Definition

A method for modeling repeated measures as latent variables is composed of a random intercept and random slope(s) that permit individual cases to have unique trajectories of change over time. Latent variables representing trajectories can be predicted from other variables and can be used to predict outcome variables in the model.

Description

Contemporary social scientists increasingly recognize the importance of collecting longitudinal data for understanding individual differences in stability and change. Traditional methods often rely on restrictive assumptions about covariance structures and complete case data that preclude research questions about individual differences in patterns of change over time. Developments in the areas of latent variable modeling and factor analysis formed the basis for *latent growth curve modeling* (Bollen & Curran, 2006; Curran et al., 2010; Duncan & Duncan 2004; Meredith & Tisak, 1990), a powerful and flexible technique for analyzing longitudinal data. The structure of a latent growth curve model is based on the assumption that an underlying, unobserved (i.e., *latent*) growth process is responsible for the pattern of change observed in repeated measures. Latent growth curve models allow formal tests of hypotheses about the mean rate of change, or *trajectory*, of an entire sample and explain individual differences in trajectories as a function of a set of covariates that are either time invariant (e.g., biological sex) or time varying (e.g., symptoms of depression).

Unconditional Growth Model

A latent growth curve model is *unconditional* when it excludes covariates that may explain individual differences in trajectories. As an illustrative example, consider a study that examines the trajectory of change in older adults' quality of life with three repeated measures (Zaninotto, Falaschetti, & Sacker, 2009). The equation for the unconditional model is

$$y_{it} = \alpha_i + \lambda_t \beta_i + \varepsilon_{it}$$

where y_{it} is the value of the quality of life variable for person i at time t, α_i is the random intercept for person i, λ_t represents the numerical value of Time at time t, β_i is the random slope for person i, and ε_{it} is the disturbance for person i at time t. By allowing the intercept and slope to vary randomly over individuals, the equations for the intercept and slope are as follows:

$$\alpha_i = \mu_\alpha + \zeta_{\alpha i}$$

$$\beta_i = \mu_\beta + \zeta_{\beta i}$$

where μ_α and μ_β are the mean intercept and mean slope across all cases (the *fixed effects*) and $\zeta_{\alpha i}$ and $\zeta_{\beta i}$ are disturbances that represent deviations of individual intercepts and slopes from the means across cases (the *random effects*). The unconditional model can represent the time trend as a single, linear slope, or it may include nonlinear forms of growth such as polynomial (e.g., quadratic, cubic) or piecewise trajectories. In the illustrative example, growth was a negative, linear slope, indicating that older adults' quality of life tends to decline at a constant rate over time.

Conditional Growth Models

The unconditional model can be expanded to include one or more *time-invariant covariates* (TIC) that explain how individuals differ from the intercept and slope for all cases. In the illustrative example, a time-invariant effect of sex on the intercept indicated that men reported lower quality of life on average compared to women. There was no effect of sex on the slope, however, indicating that the rate of decline in quality of life was similar for men and women.

The unconditional model can also be expanded to include one or more *time-varying covariates* (TVCs) that explain how individuals deviate from the mean trajectory at any given point in time. In the illustrative example, there was a time-varying effect of depressive symptoms, indicating that older adults who felt more

depressed at any given point in time reported lower quality of life. Whereas time-invariant covariates can explain individual differences in rate of change compared to the mean trajectory, time-varying covariates serve to *shift* a person off their trajectory, explaining time-specific deviations in the underlying growth process.

Latent growth curve modeling is a flexible method for evaluating change in repeated measures that can accommodate multivariate designs, distal outcomes predicted by growth, and models in which intercepts and slopes vary across multiple groups, among other expansions, allowing analysts to adapt models to suit their research questions. Complex models, however, are more challenging to estimate and may require larger sample sizes and more waves of data to arrive at reliable solutions. They require careful consideration of the correspondence between the hypothesized and analytical models to avoid misleading results due to improper model specification. As longitudinal data collection becomes increasingly popular, carefully implemented latent growth curve models can enrich research efforts by expanding the range of questions it is possible to address.

Cross-References

- ▶ Latent Variable Path Models
- ▶ Latent Variables
- ▶ Longitudinal Data Analysis
- ▶ Longitudinal Structural Equation Modeling
- ▶ Measurement Error

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Latent Happiness Variable

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Definition

The latent happiness variable is the variable which is unobservable, but which is assumed to exist and which describes the happiness as it is distributed in the population under study.

Description

Happiness as measured in a sample and happiness in the population are two variables with fundamentally different distribution properties. While the former is observable by definition and has a discrete polytomous distribution, the latter is postulated to have a continuous distribution on a two-sided bounded interval as its domain; see entry ▶ Rescaling. The population happiness variable is unobservable or *latent* and is most important, because its characteristics are (to be) applied in correlational studies of happiness.

Properties of the Latent Happiness Variable

Kalmijn et al. (Kalmijn, 2010; Kalmijn, Arends, & Veenhoven, 2011) postulate a latent happiness variable H, to which the following properties are assigned:

1. H is postulated to be a variable, which is measured at the interval level of measurement and is expressed as a real number in the closed interval [0, 10].

2. The value $H = 0$ represents the respondent's *subjectively* worst conceivable situation with respect to his or her happiness, whereas $H = 10$ represents the subjectively best conceivable situation. This choice excludes the possibility of any H-value outside the [0, 10] interval.
3. H is an intensity variable and is a strictly increasing continuous function of the happiness intensity as experienced by the respondent: If a person at the moment t_2 feels happier than at the moment t_1, then $H_2 > H_1$, where H_1 and H_2 are the H-values at t_1 and t_2, respectively.
4. The variable H is a random variable; within a population, it has a probability distribution: Different individuals in that population will have a happiness which is represented by generally different H-values.

In general, different populations will have different probability distributions of H. These are of the same type but have different values of their model parameters.

Relationship Between Both Happiness Variables

The relationship between the latent happiness variable and the observed variable is specified in the measurement model. Sometimes the observable variable is referred to as the "indicator variable"; we will avoid this term to prevent confusion with situations in which the same term is used to indicate a 0/1 variable.

The observed happiness variable in our case is assumed to be measured using a k-step discrete rating scale with response options $\{R_j; j = 1(1)k\}$, k being a natural number; usually $k \leq 12$.

The response options may be verbal, numerical, or pictorial ordered categories; their order is assumed to be unambiguous. R_1 corresponds to the most unhappy of the k response options and R_k to the most happy one.

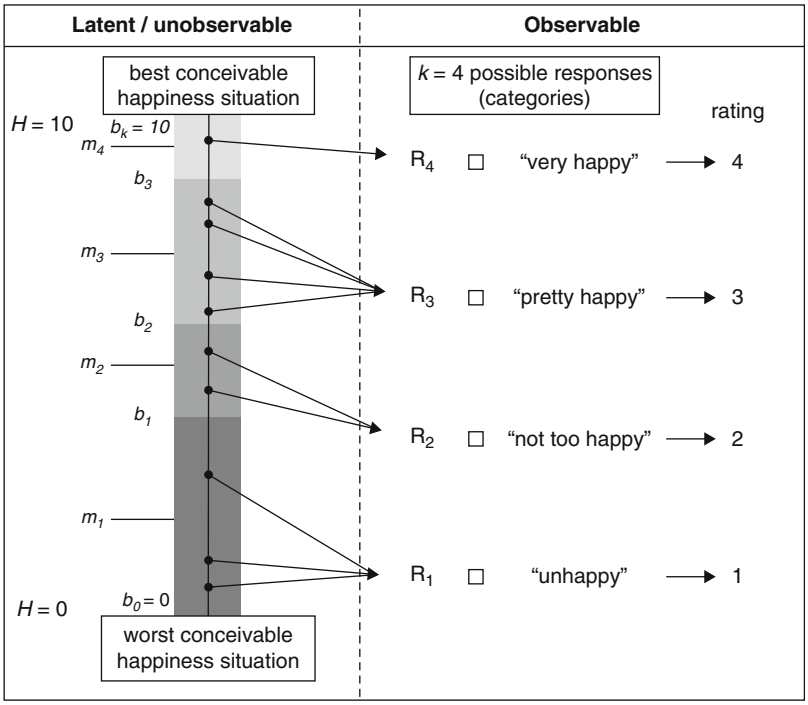
For the latent variable as defined above, the following measurement model is specified; this is illustrated below for a four-step verbal happiness scale.

1. The interval [0, 10] can be partitioned into k contiguous subintervals, each of which is defined as the subset of H-values that are mapped to the same image. All H-values within the j-th interval are mapped onto the same response option R_j.
2. The above mapping is monotonous, while the subinterval with the largest H-values is mapped as the happiest response option R_k. All these subintervals are right-hand closed half open intervals, except the closed interval including the value $H = 0$.
3. The underlying assumption is that respondents are capable of judging their own happiness situation with respect to both ends of the [0, 10] interval and of reporting their happiness intensity in terms of the corresponding response option. Conversely, all respondents selecting the option R_j are assumed to do so on the basis of a personal H-value somewhere in the j-th subinterval.
4. Except for $H = 0$ and $H = 10$, the H-values of the subinterval boundaries in the case of a nonnumerical scale are subjective, since the interpretation of the possible responses is also subjective. This applies especially to verbal qualifications, which may have a strong cultural component. The language-nation combination will influence their interpretation but also conditions such as social class, age, etc. Moreover, the emotional value of terms may shift over time. Therefore, when linking H-values to response options, especially verbal ones, some degree of variability in the results is to be expected. The H-values of numerical scales, usually either 1 to 10 or 0 to 10, are selected by the researcher running the study and in this way they are "error free." This measurement model is represented in Figure 1.

Conversion of Measurement Data in Practice

The conversion of happiness measurement data into information on the population happiness distribution is performed as a two-step process.

The first step is referred to as the *calibration phase* or *construction phase*, in which the positions of the k-1 boundaries between the k



Latent Happiness Variable,
Fig. 1 Measurement model for using a discrete scale of happiness measurement

subintervals are chosen or estimated. Moreover, the type of the probability distribution of the random variable H must be specified.

In the *application phase*, the frequency distribution, as obtained in the happiness measurement in the sample, is used to estimate the parameters of the distribution of H and to calculate the characteristics that are needed to perform the desired happiness study.

While the application phase has to be carried out for each observed happiness data set separately, the results of the calibration phase are applicable to the observations of all surveys that have been run using the same happiness measure, i.e., the leading question + all k response options, expressed in the same language and within a not too wide period of time.

The "continuum approach" is a recommended practice to perform this conversion of the observed frequency distribution into the characteristics of the population distribution; see entry ▶ Happiness Population Distribution Parameter Estimates.

This approach is sometimes referred to as the "scale interval approach." We have avoided the use of this term in this encyclopedia in order to avoid confusion with the related entry ▶ International Happiness Scale Interval Study.

Cross-References

- ▶ Happiness Population Distribution Parameter Estimates
- ▶ International Happiness Scale Interval Study
- ▶ Rescaling

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Latent Profile Analysis

► Latent Class Model

Latent Trait Theory

► Item Response Theory [IRT]

Latent Trajectory Models

► Latent Growth Curve Modeling

Latent Variable Path Models

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Synonyms

LVPMs

Definition

A latent variable path model (LVPM) is a statistical model of hypothesized relationships among a set of latent and observed variables. It is also known as a structural equation model or a simultaneous equations model.

Description

► Health-related quality of life (HRQOL) is concerned with underlying constructs associated with one's health. These constructs, which are subjective and cannot be measured directly, are called ► latent variables. However, they can be assessed by using the responses to a number of items that are associated with the constructs. These measured variables are also known as observed, indicator, or manifest variables.

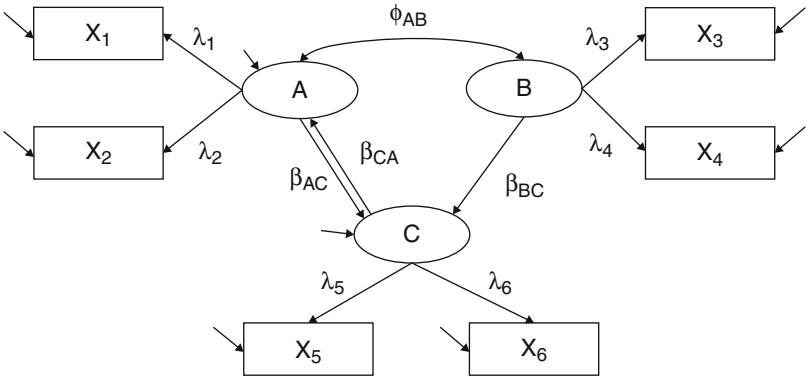
Interest in studying the relationships among latent constructs and measured items has motivated the use of LVPMs in quality of life research. An LVPM may be expressed graphically in the form of a path diagram or mathematically as a set of simultaneous equations. The path diagram developed in 1920 (Wright, 1921) by Wright, a geneticist, is fundamental to the analysis of LVPMs because it allows one to pictorially present a set of hypothesized relationships.

Wright's path diagram comprises two main components: shapes and arrows. A shape, which can be an oval or a rectangle, indicates the variable type. Latent variables are represented by ovals, while observed variables are represented by rectangles. In Fig. 1, variables *A*, *B*, and *C* are latent, whereas all the *X* variables are observed.

The arrows are used to indicate the type of relationship among the variables. A one-headed, straight arrow indicates a single causal relationship. In Fig. 1, variable *A* has a causal influence on variables X_1, X_2, and *C*, but it is also under the influence caused by variable *C*. A two-headed, curved arrow represents an association between two variables. In Fig. 1, variables *A* and *B* are associated. However, a one-headed arrow without a specific causal source indicates a residual influence from an unspecified source.

Variables in a path diagram can be further classified into two types: endogenous and exogenous. Variables that are causally influenced by one or more of the other variables are called endogenous, dependent, or downstream variables. In Fig. 1, variables *A*, *C*, and all *X*'s are endogenous. Variables that are not causally influenced by any variables are called exogenous, independent, or source variables. In Fig. 1, variable *B* is exogenous.

Exogenous variables are used to explain endogenous variables. Often there is no set of exogenous variables that fully explains an endogenous variable, so there is always unexplained influence, which is graphically represented by a residual arrow pointing to an endogenous



Latent Variable Path Models, Fig. 1 A latent variable path model

variable. This is shown in Fig. 1, where each endogenous variable has a residual arrow.

The path diagram in Fig. 1 can also be expressed as a set of simultaneous equations. Each endogenous variable contributes one separate equation, with itself as the dependent variable regressing on all variables with a straight arrow pointing to it. For example, the two endogenous variables X_1 and C contribute the following two equations:

$$X_1 = \lambda_1 A + \delta_1$$
$$\text{and } C = \beta_{AC} A + \beta_{BC} B + \varepsilon_C$$

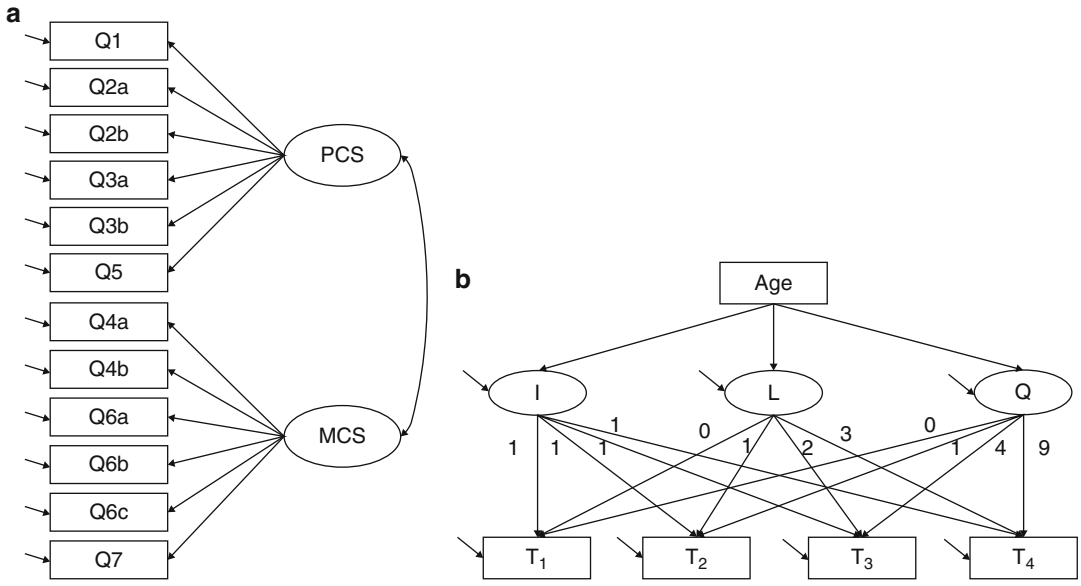
where δ_1 and ε_c are the unexplained errors. The symbols shown on the straight arrows represent the coefficients, also known as factor loadings, of the corresponding equations. The one on a curved arrow represents the correlation coefficient between the two variables. The factor loadings and correlation coefficients are unknown, but they can be estimated on the basis of either the covariance or correlation matrix of the observed variables, for example, the X variables in Fig. 1. When the correlation matrix is used, the factor loadings become the correlation coefficients.

An LVPM can involve complex relationships among a large number of variables. One common form of LVPM is confirmatory factor analysis (CFA), in which all the observed variables are endogenous and the latent variables are grouped into levels; those at a higher level have hypothesized causal influence on those at a lower level but not vice versa. Figure 2a shows a CFA model for the ▶ Short Form-12 (SF-12) Health Survey with only one level of latent variables (Fong et al., 2010). The 12 items of the SF-12 are all observed and endogenous variables driven by the latent variables: physical component summary (PCS) and mental component summary (MCS). Both the PCS and MCS are exogenous variables, and they are conceptualized to be associated. CFA models with more levels of latent variables are discussed in more detail by Brown (2006).

Another form of LVPM is the latent curve model, which is used to examine the change of an individual's underlying level over time. The underlying change is often expressed in a polynomial form. Figure 2b shows a quadratic latent curve model for four repeated measurements. The latent variables I, L, and Q are the underlying intercept, linear component, and quadratic component, respectively, which may vary across individuals. Their influences on the repeated measurements are set by fixing the factor loadings. The corresponding simultaneous equations are as follows:

$$T_1 = 1 + \varepsilon_1,\ T_2 = I + L + Q + \varepsilon_2,$$
$$T_3 = I + 2L + 4Q + \varepsilon_3,$$
$$\text{and } T_4 = I + 3L + 9Q + \varepsilon_4$$

where ε_is are the unexplained errors. Latent curve models generalize the conventional paired t-test and repeated measures analysis of variance by allowing distinct trajectories for each individual. Moreover, the influence of covariates, for example, age in Fig. 2b, on different polynomial components can also be assessed. The analysis and generalization of latent curve models are discussed in (Duncan, Duncan, & Strycker, 2006).



Latent Variable Path Models, Fig. 2 Some forms of latent variable path model (**a**) A two correlated factors confirmatory factor model of the Short Form-12 items (*PCS* physical component summary, *MCS* mental component summary, *Q* item on the scale) (**b**) A quadratic latent curve model (*I* intercept, *L* linear component, *Q* quadratic component, *T* measurement taken repeated times)

The concepts of latent variables and unexplained errors were noted as early as 1886, when Galton discussed the influence of heredity on stature (Galton & Dickson, 1886). Subsequently, there was independent development of the field by psychometricians, econometricians, and biometricians (Bentler, 1980). However, most of the early development was limited to specific applications on a few variables. In the 1970s, an integrating framework was provided by Jöreskog (1973), which has had a significant influence on the field. His ▶ LISREL program has made possible the analysis of LVPMs without substantial understanding of the technical details. During the 1980s, attention was on estimation methodology for non-normal or ordinal data. Since then, several model generalizations, such as the generalized linear latent and mixed models, have been made to accommodate different designs and applications.

Although LVPMs have been popularly used in social sciences to study complex causal relationships, they have been persistently criticized. The strongest criticism is probably the inadequacy to establish cause-and-effect relationships (Freedman, 1999). This is especially true when only cross-sectional data are used. Moreover, any LVPM needs to be checked to determine whether it adequately fits the data. A model without evidence of a poor fit may not necessarily fit the data well or may not be the only best model. Therefore, concluding cause-and-effect relationships on the basis of a suboptimal or nonunique LVPM can be risky. In general, many convergent lines of evidence must be developed before a cause-and-effect relationship can be established.

Cross-References

▶ Confirmatory Factor Analysis (CFA)
▶ Latent Variables

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Latent Variables

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Synonyms

Hidden variables; Hypothetical variables

Definition

Latent variables represent qualities that are not directly measured but only inferred from the observed covariation among a set of variables (Tabachnick & Fidell, 2001). Latent dimensions are hypothetical constructs that are used to explain behavior. Multivariate analyses are used to identify latent dimensions (e.g., ▶ Factor Analysis, ▶ Discriminant Analysis, Canonical Correlation), which are defined by the sets of weights that are assigned to the observed variables. Structural equation modeling is a statistical technique that allows one to examine the causal influences that exist among a set of latent dimensions. Latent dimensions are the essential elements of interest to social scientists because they represent the prime causal constructs operating in the mental world of individuals (Borsboom, Mellenbergh, & van Heerden, 2003).

Cross-References

- ▶ Discriminant Analysis
- ▶ Factor Analysis
- ▶ Latent Variable Path Models
- ▶ Multivariate Statistical Analysis

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Latino/Latina Religion and Fertility

- ▶ Fertility and Religion Among US Hispanics

Latinobarometro

- ▶ Consumption and Subjective Well-Being in Peru

Laughter

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Synonyms

Expression of amusement, joy

Definition

Laughter is the affective display of a range of transitory states elicited by the experience of joy, excitement, and the perception of ▶ humor, as well as, in rare conditions, brain damage in certain areas involved in the regulation of such display.

Description

Laughter is one of six affective displays that are coded on the human genome. This means that laughter is genetically organized in a universal way across mankind. The five other similar displays count sadness, ▶ anxiety, aggression, surprise, and disgust. They reduce the risk of misinterpretation of purpose in interaction, and, partly, they are linked to anabolic or catabolic physiological processes (Overeem, Taal, Gezici, Lammers, & Van Dijk, 2004).

It has been detected that in grooming of laboratory rats, they express a sound much like laughter when humans are tickled. However, this sound is only perceivable to humans after transforming the frequency from around 50,000 Hz to below 20,000 Hz (Panksepp & Burgdorf, 2000). There are marked individual differences among adult rats in the likelihood of "laughing" during grooming. This difference has been demonstrated to affect preferences among younger rats in seeking contact with "mirthful" adults rather than spending time with those less likely to signal a playful ▶ mood. Playful interaction signals the experience of being safe. Joyful laughter, therefore, is a consequence of feeling safe as well as may facilitate such experience.

Laughter in humans is elicited by different sources including humorous interaction, contagiousness, anxiety, sarcasm, tickling, and some neurological changes causing loss of control of affective display, such as Duchenne's disease (bulbar palsy), infarction in the basilar artery, and other moderate brain damages due to infarction in the upper corticospinal tract.

The French physiologist Guillaume Duchenne helped Charles Darwin (1872) define the expression of genuine joy as primarily due to the contraction of the orbicular muscles of the lower eyelids (the Duchenne smile), contraction of the great zygomatic muscles of the chin, and, in pronounced laughter, also of the corrugator muscles between the eyebrows. Vigorous expiratory movements are involved in pronounced laughter, including also oscillatory movements caused both by the diaphragm and the intercostal muscles, in combination with tensing of the glottis muscles of the larynx.

In primates, smiling is a signal of subordination, whereas in humans, smiling signals friendliness. This qualitative distinction does not preclude the quantitative escalation of mild to moderate and intense experience of mirth in human interaction that, typically, starts with a mild to moderate smile and may escalate into pronounced laughter provided the social context and cognitive process are appropriate. Although the morphology in expression of laughter is universal, differences in social learning strongly impact the affective display due to roles, ▶ norms, relations, and contexts that act as inhibitory or facilitative modulators.

Heart rate and systolic blood pressure are strongly boosted by laughter, with immediate rise of sometimes more than 50 beats per minute at onset and sudden return upon termination. In contrast with the cardiovascular system, lymphatic circulation has no pump to assure the circulation and, rather, is dependent upon pressure changes due to a range of physical activities including the oscillatory changes induced by laughter. Therefore, it is assumed that laughter improves lymphatic circulation.

Complex brain processes organize the affective display of laughter, and the consequences of laughter immediately feedback on the brain to cause secondary changes including a relative shift to negative polarity with higher amplitude upon the funnier jokes. Also, the right and left hemispheres appear to adopt a higher level of synchronous processing following the experience of mirth, and this change is not due to the respiratory changes in laughter (Svebak, 1982). Magnetic resonance studies show common

patterns of activation in the organization of affective displays (left hemisphere basal ganglia, right hemisphere putamen, the insular cortex, thalamus, lower occipital gyrus, cauda nuclei (Iwase et al., 2002)), whereas laughter due to the experience of mirth induced by humor is a very complex cognitive process that involves even more extensive brain areas.

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Law of Diminishing (Marginal) Returns

▶ Diminishing Returns

Law of Rare Events

▶ Poisson Models

Law of Small Numbers

▶ Poisson Models

Laxative Colitis

▶ Irritable Bowel Syndrome

Layoff

▶ Unemployment

LDI

▶ Landscape Development Intensity

League Tables

▶ Composite Indicator(s)

Learned Hopefulness

▶ Empowerment

Learning

▶ Training

Learning Context, Supportive

▶ Literate Environment

Learning Disabilities

▶ Intellectual Disability

Learning to Learn

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Definition

Learning to learn is one of eight key competences defined by the European Commission in the context of lifelong learning and a competitive knowledge economy (Education Council, 2006).

Description

Learning to learn is one of eight key competences defined by the European Commission in the - context of lifelong learning and a competitive knowledge economy (Education Council, 2006). Situated in the educational context, it refers to a cross-curricular competence, i.e., not bound to a specific subject but applicable in all subject areas. As a competence, it is composed of knowledge, skills, attitudes, and values. As a key competence, it is regarded necessary for individuals throughout their life course, for employment and integrated in everyday life activities (Hoskins & Fredriksson, 2008). The learning to learn concept is connected to the ongoing work on the twenty-first century skills (http://www.p21.org/overview/skills-framework) as well as to the European community activity on New Skills for New Jobs (http://ec.europa.eu/social/main.jsp?catId=568). It connects as such to the needs from the labor market in a globalized and rapidly changing world economy.

In a closer educational perspective, learning to learn is the ability for students to use effective learning strategies. As such it represents an important task for schools and teachers – in a perspective of lifelong learning. To be able to use effective learning strategies is important for all students. As it might involve students taking greater responsibility for their own learning processes, weaker students in particular need to be taught how to learn more effectively (OECD, 2010).

To develop the competence, learning to learn is important for individuals. Except for supporting the general learning processes, such competence is supportive of individuals' full capacities to act as creative, learning, and active citizens in society.

Cross-References

- ▶ Active Citizenship
- ▶ Competence
- ▶ Lifelong Learning
- ▶ Skills

References

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Least Squares Regression Line

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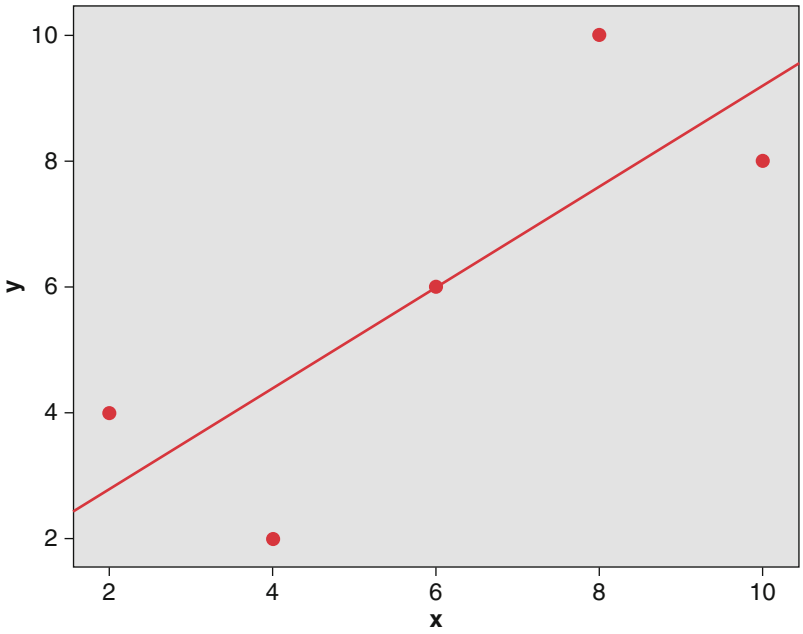
Description

A least squares regression line identifies the general trend in the relationship between a dependent variable and one or more independent variables measured on interval or ratio scales.



Least Squares Regression Line, Graph 1 The least-squares regression line for the data in the example

Given a scatter of points in the relationship between two variables (a bivariate regression), the least squares regression line minimizes the sum of the squared variations between it and the individual observations – i.e., the vertical distances between the individual observation points and the regression line.

Two parameters define the line's trajectory: The constant value (usually termed a) is the value of the dependent variable (y) when that of the independent variable (x) is 0, and the slope coefficient (usually denoted by b) is the change in the value of y for a unit increase in the value of x (i.e., if $b = 0.5$, for every increase of 1 unit in the value of x, y increases by 0.5 of a unit).

The calculations involved are illustrated by the following small data set below and displayed in Graph 1 (of course, it would be bad practice to fit a regression line to a data set with only five observations; such a small set is used here for illustrative purposes only):

	x	y	$\sum(x-\bar{x})$	$\sum(x-\bar{x})^2$	$\sum(y-\bar{y})$	$\sum(x-\bar{x})*(y-\bar{y})$
1	2	4	–4	16	–2	8
2	4	2	–2	4	–4	8
3	6	6	0	0	0	0
4	8	10	+2	4	+4	8
5	10	8	+4	16	+2	8
$\sum$				40		32

(*continued*)

The slope coefficient – b – is derived as the ratio of the covariance of the two variables, x and y, to the variance in the independent variable. It is a measure of the rate of change in y relative to the rate of change in x.

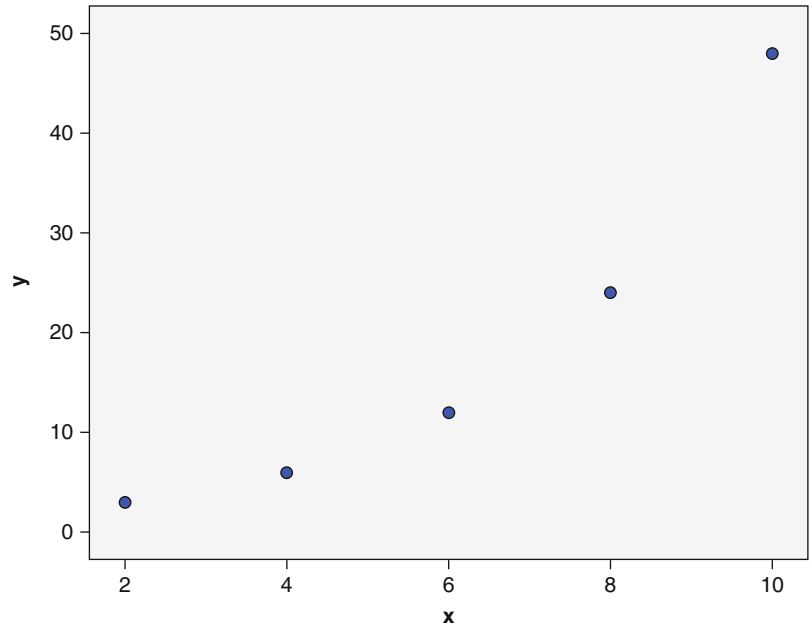
The rate of change in x is measured as its variance, the mean of $\sum(x-\bar{x})^2$, which in the above example is $40/5 = 8$.

The covariance of x and y is measured as the mean of their product, $\sum(x-\bar{x})*(y-\bar{y})$, which is $32/5 = 6.4$.

The slope of the regression is thus $6.4/8 = 0.8$: for every increase of one unit in x, y increases by 0.8 so that if $y = 10$ when $x = 10$, then when $x = 20$, $y = 10 + (10 * 0.8) = 18$.

The constant value (a) is derived by a small piece of algebra. In least squares regression, the line always passes through the intersection of the two means ($\bar{x}$ and $\bar{y}$). Thus,

$$\bar{y} = a + b\bar{x}$$



Least Squares Regression Line, Graph 2 Example of a non-liner relationship

So

$$a = \bar{y} - b\bar{x}$$

We know that $\bar{x} = 6$ and $\bar{y} = 6$, So

$$a = 6 - 6 * 0.8 = 6 - 4.8 = 1.2$$

So the full equation is

$$y = 1.2 + 0.8x,$$

as shown in Graph 1.

Each of the coefficients can be either positive or negative. A negative b values indicates a downward slope from left to right; as the values of x increase, those of y decrease.

In a multivariate linear regression, additional values of x are introduced, as in the extended example below:

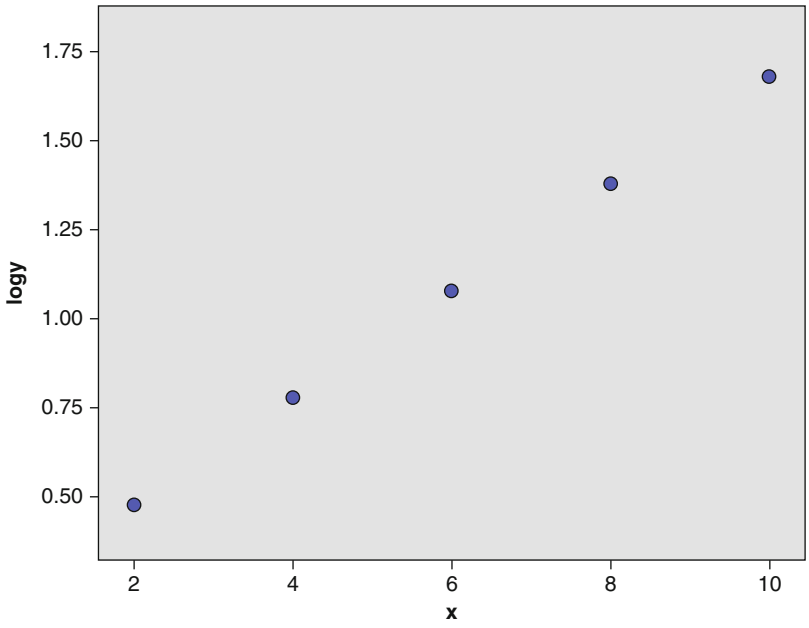
	x_1	x_2	y
1	2	3	4
2	4	4	2
3	6	5	6
4	8	2	10
5	10	1	8

In this, whereas y appears to increase with x_1, it apparently decreases with x_2. This is confirmed by the multiple regression equation:

$$y = 3 + 0.688x_1 - 0.375x_2$$

Thus, when both x_1 and x_2 are set at zero, y is equal to *3*. For any given value of x_1 (i.e., holding x_1 constant in the usual terminology), as x_2 increases by 1 unit, y decreases by 0.375 units, so that if $x_1 = 4$, when x_2 is 3, y is $[3 + (4 * 0.688) - (3 * 0.375)] = 5.752$ and when x_2 is 4, y is $[3 + (4 * 0.688) - (4 * 0.375)] = 4.252$. Similarly, for any given of x_2, as x_1 increases, so does y: If $x_2 = 3$, when $x_1 = 4$, y = 4.627, and when $x_1 = 5$, y = 5.315.

Least squares regression assumes a linear relationship. Where this is not the case, the relationship can be "linearized" by transforming one or both of the variables. Graph 2, for example, shows a relationship where y increases more rapidly than x – for every increase of 2 units in x, the value of y doubles. If y is replaced by its base10 logarithm, this relationship becomes linear, as shown in Graph 3.



Least Squares Regression Line, Graph 3 The relationship shown In Figure 2, with the dependent variable log transformed

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Left Ventricular Dysfunction (LVD-36)

► Health-Related Quality of Life and Heart Failure

Left-Behind Children

► Child Well-Being and Transnational Families

Legal Entitlement to Housing

► Housing Tenure

Legatum Prosperity Index

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Synonyms

LPI

Definition

The 2010 Legatum Prosperity Index of a nation or territory ("a country") is defined as the sum of two standardized combined statistics: the income score and the well-being score. Each of these is the weighted sum of nine standardized subindices: "The Economy, Entrepreneurship & Opportunity, Governance, Education, Health, Safety & Security, Personal Freedom, and Social Capital. Each sub-index in turn is composed of two components: one relating to subjective well-being and one relating to income" (Legatum, 2011b).

Legatum Prosperity Index, Table 1 Examples of the Legatum Prosperity Index and subindices (Legatum, 2011c)

Country	Norway	Denmark	Pakistan	Zimbabwe
Overall rank	1	2	109	110
Subindex ranks:				
Economy	1	4	86	110
Entrepreneurship and opportunity	6	1	88	110
Governance	12	2	102	110
Education	4	5	103	101
Health	4	17	91	107
Safety and security	2	6	105	110
Personal freedom	2	6	110	104
Social capital	1	2	110	88

The subindices are computed by regression from 89 variables' survey data, most of which are from the Gallup World Poll. The dependent variables in the regressions are for the subjective well-being dimension "Life Today" from the Gallup World Poll (2010) and Gross Domestic Product (GDP) per capita for the income dimension. All variables are weighted into the income score and the well-being score by their respective correlation coefficients. For details, see Legatum Institute (2011a, 2011b).

Description

Like the Human Development Index HDI and the Life Quality Index LQI, the Legatum Prosperity Index (LPI) was introduced by the Legatum Institute from a concern that the human achievement of a country is not adequately expressed by the GDP per capita. Unlike the HDI, which merely serves to rank countries according to its measure of "development," the LPI analysis presents a major advance toward progress: The subindex scores give an indication of what changes a country might make to increase its "prosperity" in comparison with other countries.

The 2010 Legatum Prosperity Index was calculated for 110 countries that were then ranked overall and by subindex (Legatum, 2011c). Table 1 shows some examples.

The overall results can be customized by the user (Legatum, 2011c), who can change the weighting placed on each subindex.

Cross-References

- ▶ Calibrated Development Index
- ▶ Human Development Index (HDI)

References

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Leisure

- ▶ Play Behavior
- ▶ Spare Time

Leisure Time

- ▶ Spare Time

Leisure Time with a Partner

- ▶ Free Time with Partners

Lelystad

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Definition

Lelystad is the capital city of the Dutch province Flevoland and is located about 45 km northeast of Amsterdam, the capital city of the Netherlands.

Description

Lelystad has 75,184 inhabitants (1 April 2011). About 25 % of the inhabitants are younger than 20 years old and 18 % are 60 years or older. Lelystad has relatively few people in the retirement category (65 years or older). 5 % of the households are single-parent families, about 30 % are couples without child(ren), and 21 % are couples with child(ren). With 28 % of the households, Lelystad has relatively few single-person households (Gemeente Lelystad, 2010a).

With 28 % of the population, Lelystad has more than an average percentage of ethnic minorities. There are especially more than average non-western immigrants (about 20 % of the population).

Since 2005 Lelystad uses a "city panel" of about 1,600 people of 18 years and older, answering questions on a regular basis. Next to this panel, regular surveys are conducted. One of the major surveys is the biannual "life situation survey." About 2,300 people participate in this survey.

Some of the questions are about subjective quality of life. Some examples include satisfaction with the house (which scores an average of 7.9 on a 1–10-point scale), satisfaction with the living environment (7.3), livability of the neighborhood (7.2), and safety in the neighborhood (7.1).

Life Situation

Next to these figures every 2 years a fact sheet is presented which has information on a wide variety of social domains. These domains are however presented in one index: the life situation index. This index is developed by the Netherlands Institute for Social Research | SCP. This index integrates eight important life domains: health, housing, participation in sports, social participation, sociocultural leisure activities, ownership of durable consumer goods,

Lelystad, Table 1 Life Situation scores for a selection of social groups

	2004	2006	2008	2010
Average life situation Lelystad	100	101	101	102
Men	101	103	102	103
Women	99	100	100	102
18–29 years old	101	100	101	101
30–39 years old	103	104	103	104
40–54 years old	102	104	102	104
55 years or older	94	98	99	101
Single-person households	88	89	89	91
Couples without child(ren)	100	103	103	104
Couples with child(ren)	104	106	106	106
Single-parent family	94	92	94	94
Indigenous – men	103	104	103	106
Indigenous – women	100	101	101	104
Ethnic minority – men	95	96	97	95
Ethnic minority – women	94	95	96	96

Source: Gemeente Lelystad (2010b).

holidays, and mobility (see "► Life Situation Index" and Boelhouwer, 2010).

In Lelystad, they present developments on the life situation from 2004 onward. The index is set at 100 for 2004. In 2010 the life situation had improved with 2 % since 2004 (Gemeente Lelystad, 2010b).

The life situation of a couple of social groups is lower than average. This is true for people living alone, one-parent families, and ethnic minorities. Couples with children on the other hand have overall a better life situation (Table 1).

Health and Happiness

Next to figures about the life situation, the report has a couple of subjective indicators. About 80 % of inhabitants of Lelystad say to be happy or very happy – this percentage does not change a lot over time. 36 % say his or her health is excellent or very good.

There is a positive relationship between the life situation of people, their happiness, and subjective health.

Life Situation as an Effect-Measure

In Lelystad the SCP life situation index is admitted as an effect-measure to the communal budget. Local government has put as a policy-goal (for the year 2011–2014) to assure that vulnerable groups (mainly the elderly and the handicapped people) can actively participate in society. To measure whether the policies aimed at this goal work, the life situation score has to rise with at least 4 % (Gemeente Lelystad, 2010c).

Cross-References

- ► Life as a Whole, Satisfaction with
- ► Neighborhood
- ► Satisfaction with Life as a Whole
- ► SCP Life Situation Index

References

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Length of Life Inequality

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Synonyms

Inequality of mortality; Relative length of life inequality (RLI)

Definition

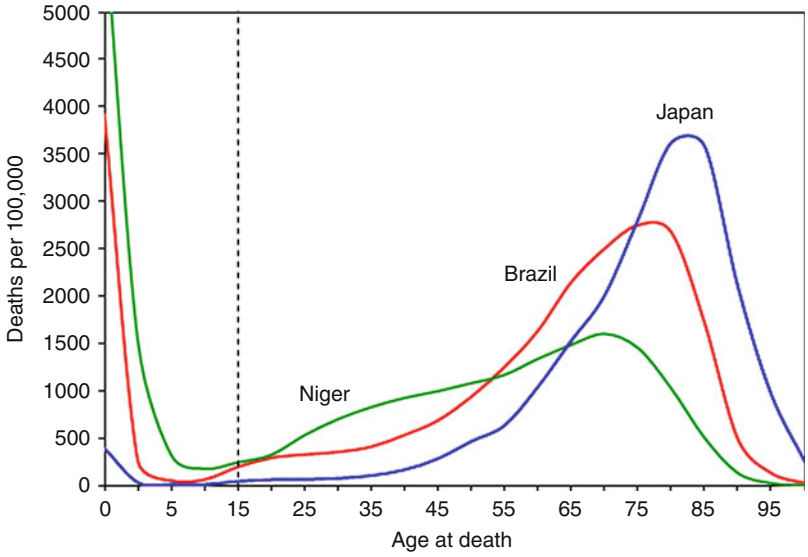
Length of life inequality refers to the variation in length of life (or age at death) within human populations. Not everybody dies at the same age; hence, there is inequality in length of life among individuals. This variation is in part due to biological differences and intangible factors like luck. In part it is due to inequality in the distribution of resources within societies because access to more resources allows individuals to have a longer life. This is of particular interest to social scientists, because it means length of life inequality may be partly an outcome of social policies. Length of life inequality varies considerably among societies. In some countries length of life is more equally distribution than in others. This variation in length of life inequality is highly correlated with variation in ► life expectancy. To study cross-national differences in length of life inequality, it is therefore important to control for variation in life expectancy. The variation in length of life inequality adjusted for life expectancy has been called relative length of life inequality (RLI).

Description

Scholars have long been interested in variation of age at death. One of the first explicit studies on length of life inequality can be found in the work of Le Grand and others in the 1980s (LeGrand, 1987, 1989; Illsey & Le Grand, 1987; Silber, 1988). Le Grand computed inequality measures over the distribution of age at death to gain insight into cross-national variation in health inequalities. He found substantial differences among 32 countries in what he called *inequality of mortality*. Since the turn of the century, there has been renewed interest in the variability of age at death. Some of this interest in variation of length of life was driven by the idea of rectangularization of the human survival curve; the observation that at higher ages there is less variation in age at death (e.g., Wilmoth & Horiuchi, 1999; Cheung, Robine, Tu, & Caselli, 2005). Other authors were more interested in inequality as such (Shkolnikov, Andreev, & Begun, 2003; Edwards & Tuljapurkar, 2005; Smits & Monden, 2009).

To illustrate length of life inequality, Fig. 1 presents the distribution of length of life for males in three populations with very different levels of life expectancy. For each of these distributions, a mean length of life can be computed and a measure that indicates to what extent length of life in that population varies among individuals. This variation in length of life (or age at death) among individuals is the focus of this entry. As Fig. 1 shows, the distribution of length of life is a two-peaked distribution. The first peak in the youngest age category reflects the relatively high mortality directly after birth. The second peak is somewhere in the 65+ age group, surrounding the age at which most adults die. A comparison of the distributions of the two populations in Fig. 1 illustrates that length of life inequality might be influenced by changes at each of these peaks. In population A, the variation around the infant and old age peaks is smaller than in population B. Hence, both among the young and among the old, inequality is lower in population A.

The underlying causes of variation in mortality may be different for infant and child mortality than for adult mortality. Analyzing length of life inequality across all ages – including both peaks simultaneously – therefore produces outcomes that are hard to interpret. Therefore it is advisable to study length of life inequality separately for adults. As variation in adult length of life is expected to depend more on social distribution mechanisms than infant and child mortality, researchers with a



Length of Life Inequality, Fig. 1 Distribution of age at death for males in Niger, Brazil and Japan in 2000 (Source: Smits & Monden, 2009)

social science background like Edwards and Tuljapurkar (2005) and Smits and Monden (2009) focused their studies on adult length of life inequality.

Measurement

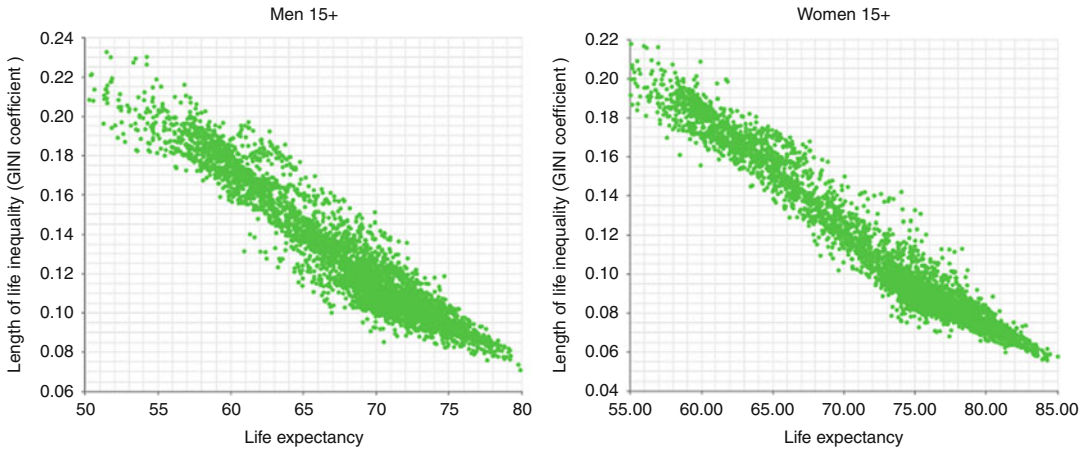
Inequality in the length of life distribution can be described with many indices. The ▶ Gini coefficient is used most frequently, but also the Theil coefficient, the interquartile range, the life disparity measure, the standard deviation, and other measures have been applied (Wilmoth & Horiuchi, 1999; Kannisto, 2001; Edwards & Tuljapurkar, 2005; Van Raalte et al., 2011; Shkolnikov et al., 2003; Smits & Monden, 2009). The choice of a measure seems not critical; several studies show that the various measures for length of life inequality are highly correlated with each another (e.g., Wilmoth & Horiuchi, 1999; Vaupel, Zhang, & Van Raalte, 2011).

A great advantage of using length of life inequality as an indicator of social inequality is that compared to other such indicators (e.g., inequality in income, wealth, education, or occupational status), it is much easier to measure. The information needed for constructing length of life inequality measures is much more widely available and straightforward than the information needed for constructing other inequality measures. It consists of basic demographic data – number of living persons and deaths by age group – which in developed areas is generally routinely collected by statistical offices. On the basis of this information, life tables can be constructed, from which the population's length of life (or age at death) distribution can be derived (of which some examples are presented in Table 1). In the last decades, construction of length of life inequality measures has become even easier, because several databases with high-quality data have been established, like the Human Mortality Database www.mortality.org and the Human Life-Table database www.lifetable.de. These databases contain thousands of life tables, including long time series, for many countries, especially more developed ones.

Length of Life Inequality and Life Expectancy

An interesting problem researchers of length of life inequality face is the existence of a very high (negative) correlation between length of life inequality and life expectancy. Countries that have higher levels of life expectancy tend to have lower levels of length of life inequality. This correlation is so high (over −.90) that the variation in length of life inequality among populations almost completely parallels the variation in life expectancy. This makes one wonder whether studying length of life inequality without correcting for life expectancy, as has been done by many scholars in the field, makes much sense. Smits and Monden (2009) therefore propose to study length of life inequality among populations with similar levels of life expectancy. This variation in length of life inequality adjusted for life expectancy is called relative length of life inequality (RLI).

To gain understanding of the source of the high correlation between length of life inequality and life expectancy, it is helpful to look at the distributions of length of life in Fig. 1. From age 15 on, these distributions show a clearly skewed pattern for the three levels of life expectancy. The distribution moves to the right when life expectancy increases, but most changes take place in the left-hand side of the distribution. The changes taking place at the right side of the elderly peak in Fig. 1 are relatively small. Although the number of people reaching an age of more than one hundred has increased considerably in the last century, this number remains small compared to the number of people reaching a maximum age of 75. This suggests that the distribution of length of life is more or less bounded at the right side, not bounded in a strict sense – the proportion of people reaching very high ages increases gradually – but bounded in a relative sense, as further length of life gains become increasingly difficult at a very high age (compare Keyfitz, 1978; Kannisto, 2001). With increasing life expectancy, age at death therefore becomes more and more concentrated in a small age band around the elderly peak, which implies that the variation in length of life becomes smaller. In other words, an increase in life expectancy leads to a reduction of



Length of Life Inequality, Fig. 2 Length of life inequality by life expectancy for adult men and women (aged 15+) based on 9063 life tables for 212 countries (Source: Smits & Monden, 2009)

mortality differences and thus to a decrease of length of life inequality.

Relative Length of Life Inequality

To gain more insight into the pattern of association between length of life inequality and life expectancy, Smits and Monden (2009) brought together about 9,000 yearly life tables for men and women from almost all countries of the world, including long time series dating back to the nineteenth and sometimes even the eighteenth century. Figure 2 is taken from their paper. It shows length of life inequality measured by the Gini coefficient plotted against life expectancy for all male and female life tables. The data are for individuals aged 15 and over. Each point in Fig. 2 represents a life table for a specific country in a specific year.

The points are concentrated in an elongated cloud running from the upper left to the lower right, thus reflecting the strong negative association between length of life inequality and life expectancy. However, this correlation is only part of the story, for at each level of life expectancy, there is considerable variation between societies with lower and societies with higher life expectancy. The magnitude of this variation is substantial. One way to express it is to calculate how many more premature deaths are observed in the less equal societies compared to the more equal ones. At the same level of life expectancy, premature mortality in the 15–50 age group was found to be 33–72 % higher in the most unequal quintile of the distribution compared to the most equal quintile (Smits & Monden, 2009, p. 1119).

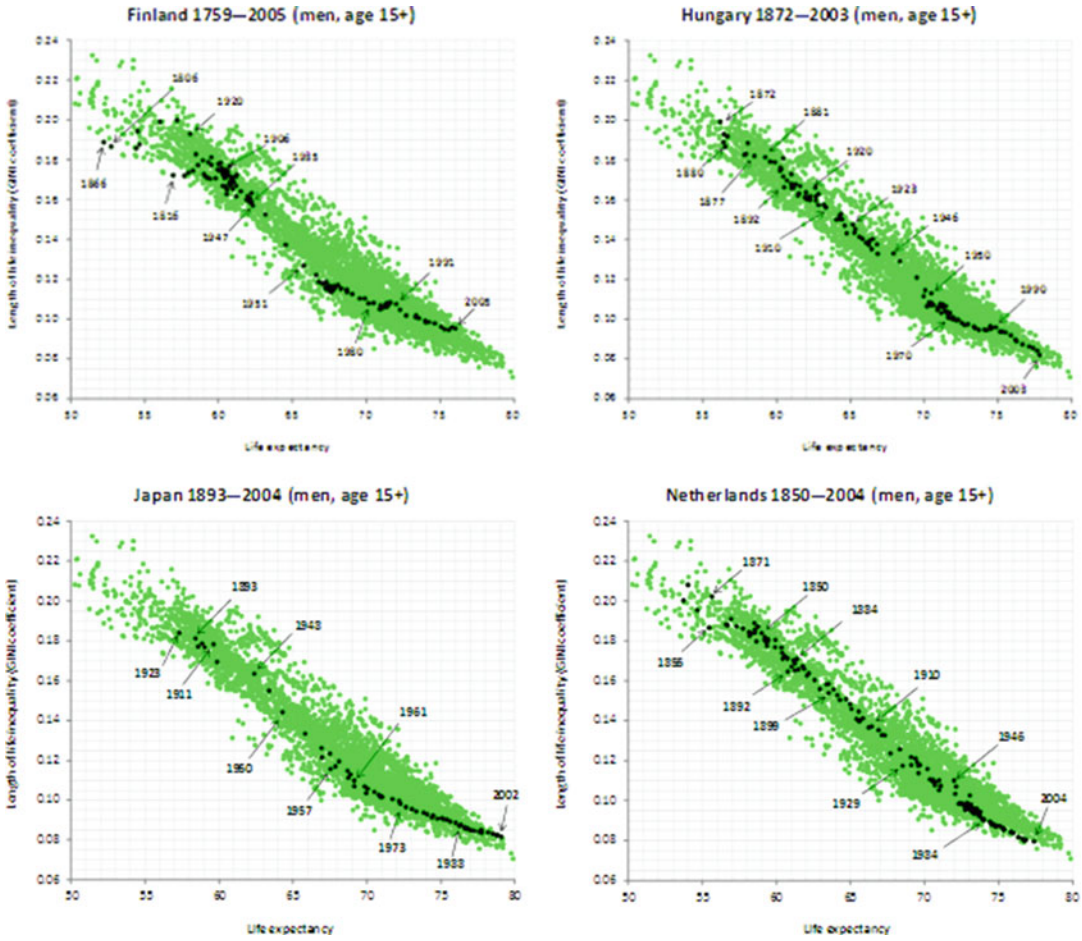
Figure 2 clearly shows that the absolute level of length of life inequality is not necessarily a meaningful measure. Whether a specific level of length of life inequality is high or low depends on the population's position in the life expectancy space. In Fig. 2 we can see that in a male population with a life expectancy of 65, a Gini of 0.12 would mean low inequality, whereas in a male population with a life expectancy of 75, the same Gini would indicate high inequality. This observation underlines the importance of using an inequality measure based on a comparison of inequality among countries with a similar level of life expectancy, like the Relative Length of Life Inequality (RLI) of Monden and Smits (2009).

Findings presented in Fig. 2 were confirmed by Vaupel, Zhang, and Van Raalte (2011). Using data from the Human Mortality Database, they found a similar strong negative relationship between life expectancy and length of life inequality. Their analyses showed that in most cases, the countries with highest life expectancy displayed least inequality.

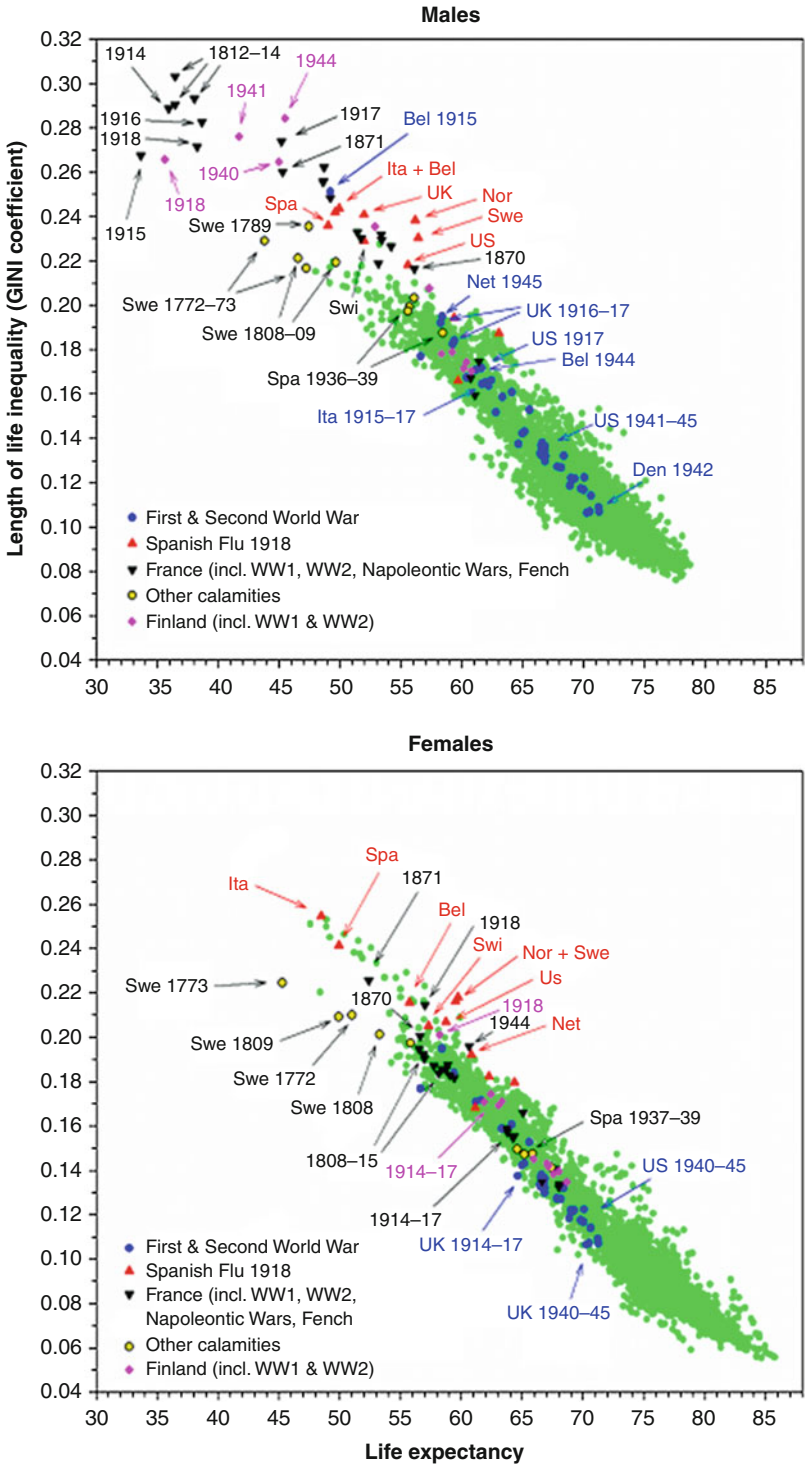
Trajectories of Countries Over Time

Each point in Fig. 2 represents a specific country in a specific year. By highlighting all available points for a specific country, the trajectory described by that country through the inequality-life expectancy space is revealed. Figure 3 shows such trajectories for males in Norway, Hungary, Japan, and the Netherlands. The trajectories reveal that the country-specific patterns are not steadily decreasing chronological lines but that depending on what happens in a country in a specific year the points may jump forward and backward through space. There are huge differences in whether and when such jumps took place and in which year the countries reached a certain level of life expectancy and inequality.

For instance, in Finland the points for 1806 and 1866 are closely together, whereas the point for 1816 lies much more to the right. In Japan, the point for 1893 lies between those for 1923 and 1911. We also see that during the 1950s and 1960s, the trajectory for Finland is located near the lower boundary, indicating that during this period RLI was relatively low. However, then it starts moving upward in the 1970s and 1980s, reaching a relatively high level of inequality in 2005. The trajectory for Japan is from the 1950s to the 1980s located near the lower boundary, but moves in the 1990s to the upper boundary. Still in 2002, both inequality and life expectancy in Japan are clearly lower than in Finland in 2005. Hungary and the Netherlands take in a middle



Length of Life Inequality, Fig. 3 Trajectories of length of life inequality by life expectancy for adult women (aged 15+) in Finland, Hungary, Japan and Netherlands



Length of Life Inequality, Fig. 4 Length of life inequality in years of wars, epidemics or times of other calamities

position in the first half of the twentieth century, but from the 1980s on, the Netherlands moves to the lower – more equal – part of the distribution, while Hungary remains in the middle.

Wars, Epidemics, and Other Calamities

In Fig. 2, the variation in length of life inequality is shown for more or less "normal" situations. Even though the variation within and among countries is substantial, the points occupy only a small part of the inequality-life expectancy space. However, sometimes extreme calamities take place – wars, epidemics, and famines – in which life expectancy is reduced so drastically and inequality increases so much that the observations for those years jump out of this "normal" space. As our database includes life tables for a number of calamity years, we are able to give an impression of what happens with the length of life inequality-life expectancy relationship in those years. Figure 3 provides an extension of the data in Fig. 2 with those years included.

Most calamity data are for World War I, World War II, and the Spanish flu pandemic of 1918. Also included are French data for the Napoleonic wars (1806–1815), the French-German war, and the Paris commune (1870–1871). The Sweden data include the famine of the 1770s and the Russo-Swedish war (1808–1809). For Spain the civil war (1936–1939) is included and for Finland the 1918 independence war with Russia.

Figure 4 shows that the points for the calamity years are not positioned randomly in space but rather neatly to the upper left of the points for the non-calamity years. This suggests that the relationship between length of life inequality and life expectancy in these years does not differ fundamentally from this relationship in (more) normal years. The relative position of the points is, however, not completely similar; the Spanish flu year (1918) and many war years have relatively high RLI, indicating that rather much young persons were affected. The Swedish famine years 1772 and 1773 have relatively low RLI, indicating that the elderly were hit relatively hard.

Another observation is that the male mortality pattern both in terms of life expectancy and length of life inequality is more heavily affected by wars than the female pattern, whereas the effect of the Spanish flu and famines looks about equal for males and females.

Conclusion

Length of Life Inequality is one of the most fundamental forms of inequality in the world. Whereas inequalities in socioeconomic outcomes, like income or wealth, can be compensated by social redistribution mechanisms, a higher level of length of life inequality generally implies that more individuals die premature, a situation from which no recovery is possible. Countries have different degrees of length of life inequality, even when they have similar levels of life expectancy. And countries show remarkable differences in the historical patterns of length of life inequality and life expectancy. Understanding these differences is an important challenge for health researchers as well as social scientists.

Why, for instance, would the risk of dying prematurely differ substantially among highly developed countries with similar levels of life expectancy? The differences in relative length of life inequality, found even among highly developed countries, stress the importance of social distribution mechanisms for mortality patterns. As these countries differ little in technological development, and genetic differences are probably too small to play an important role, it might be mainly differences in social distribution mechanisms and behavioral differences that are responsible for the cross-national differences.

Preliminary research on the factors responsible for the length of life inequality within and among highly developed countries has been conducted by Shkolnikov et al. (2011) and Nau and Firebaugh (forthcoming). These studies showed that life expectancy variation is mostly caused by variation in mortality due to leading causes of death (heart disease and other chronic diseases). Variation in length of life inequality, on the other hand, turned out to be mostly affected by factors operating among the younger age groups, like accidents and violence and other external causes of death.

It is important to monitor absolute and relative length of life inequality in addition to other indicators of health inequality. Length of life inequality reflects generic inequality in mortality, the total impact of all biological, social, and behavioral determinants of health. It sets the bandwidth for more specific forms of inequality, such as educational, ethnic, and regional differences in mortality. A country's RLI shows the overall performance of the country with regard to the distribution of (health) resources, compared to other countries at the same life expectancy level. Analyzing health differences among social groups within the country is necessary to find out where exactly policies should be directed to improve this performance.

As advancements in biomedical sciences reduce mortality from diseases, unequal social distribution becomes increasingly important as an obstacle to further gains in life expectancy. When new possibilities to live longer are only available to a select group in society, life expectancy of this group will rise, but the country's overall performance will not improve much. This is clearly exemplified by the performance of countries like France and the USA, where the gains in life expectancy for males in the last decades have been modest and RLI has increased, in spite of the fact that health expenditures were high in these countries (Smits & Monden, 2009). Is this because health resources have been redistributed to the poor insufficiently, or are other factors at play? To answer this question, new research is needed of the relationship between a country's RLI and its health and social policies as well as other social and economic factors.

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Lesbian

► Sexual Orientation

Lesbian, Gay, Bisexual, Transgender, Queer (LGBTQ) Relationship Violence

► Same-Sex Partner Violence

Less Developed Countries

► Developing Countries

Lessons About Optimal Sexual Experiences from Remarkable Lovers

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Synonyms

Eroticism; Great sex; Optimal sexual intimacy; Pleasure, sexual

Description

Popular culture suggests that "great sex" is something reserved for young, attractive, able-bodied, unmarried, heterosexual individuals and is not to be found within the typical realm of sexual experience in the elderly. The Optimal Sexuality Research Team of the University of Ottawa attempted to challenge these conventional assumptions and to learn from those who have attained a lifetime of optimal sexual experiences, that is, those who had been partnered for over 25 years (Kleinplatz 2006; Kleinplatz & Ménard, 2007; Kleinplatz et al., 2009; Kleinplatz, 2010). The following summarizes the lessons learned from key informants (i.e., individuals who have expertise in the phenomenon under study) as well as implications of these findings.

1. *We Can Learn to Have Great Sex…Which First Requires Some Unlearning*

None of the extraordinary lovers felt that his/her facility for optimal sexual experience was some innate quality brought to the surface during their youth. Rather, they believed that the quality of their sex lives and their perceptions of what sex could become had grown over time. Many felt that there had been a distinct improvement in their sex lives as they reached mid-life. They explained that the pinnacle of sexual relations could grow given time, experience, and commitment to making sex extraordinary. As one older man described how sex changed over time, he noted, "Instead of rushing by the windows in a train, one watches the scenery."

A prerequisite to sexual growth may be *unlearning* rigid beliefs that many North Americans acquire during childhood and adolescence. In particular, this may mean overcoming ideas perpetuated by conventional sex scripts and overcoming associations between sex and shame. It may be important to get rid of the old one-size-fits all ► norms and grow into individual and unique definitions of sexuality. For many, this shift involves moving from performance-oriented sex to ► pleasure-oriented sex. As one man stated, "As sex became 'greater' it became slower, less goal-directed and orgasm focused."

2. *Optimal Sexual Experiences Take Effort – They Do Not Happen Spontaneously*

This lesson learned is counter to the popular belief that sex should be "natural and spontaneous." Optimal sexual experiences require extensive planning and prioritizing as well as being deliberate and intentional. Sex of this caliber does not simply happen but must be welcomed and invited into one's life. This means that for those who aspire towards remarkable sexual experiences, it is important to devote considerable time to sex. Although the frequency of sex may diminish with age, the amount of time dedicated to sexual encounters may actually increase for those who are engaged in optimal sexual experiences. This might involve "setting the stage" for the sexual episode by adapting the environment to fit the couple's sexual proclivities. The details of the environment would be unique to the couple, though the intent of organizing the environment remained constant: "The most important thing is that it not interfere with whatever kind of sex you wanted to have that day." Given the penchant for

intentionality, and the devotion of time and energy, spontaneity is not generally a factor in sex worth wanting.

3. *Long-Term* Relationships *Can Be Fertile Ground for Optimal Sexual Experiences*

Popular belief suggests that long-term relationships breed sexual boredom; however, recent research indicates that it may facilitate optimal sexuality (Kleinplatz et al., 2009). Optimal sexual experiences were found commonly in relationships deemed to be characterized by ▶ trust, consideration, respect, and especially open, expressive, responsive, and empathic communication. The relational context in which optimal sexual experiences can blossom (Kleinplatz et al.) include a profound connection that deepens with time. Experiencing a deep connection with a partner provides lovers with a sense of safety in risk-taking and being vulnerable during sex together. As an older woman noted, "I think it requires generosity and I go back to the old things that I keep saying again and again, communication, openness, truthfulness, an atmosphere of trust in the relationship. I have my best sex, always, with my partner that I've been with for 40 plus years, and the fact that we have been through so much and through so many changes and have so much history makes a relationship that is just rich beyond measure."

4. *Balancing Exploration and Familiarity Creates Enough Safety to Risk*

A balance between emotional risk, exploration, and familiarity creates an atmosphere rich with "anticipated surprise" (Kleinplatz, 2010). In the context of exploration, there is an element of ▶ lifelong learning about sex, sexuality, ourselves, and our partners, and it is through this lifelong learning that we develop the propensity for optimal sexual experiences. Great lovers emphasized the bond and trust that they had built over a lifetime of experiences together. The combination of these elements allowed them to take risks with one another despite the potential for vulnerability. One older man said, "You've been through so many ups and downs that you know you're going to come out of it OK."

5. *Optimal Sexual Experiences Are Like a Fine Wine. . .They Improve with Age*

Optimal sexual experiences can grow with age, maturity, and experience if learning continues throughout one's lifetime. The improvements follow from relinquishing goal-directed or orgasm-focused sex. As one older man stated, "Young people are more performance and. . . they're just too anxious. Older people have more understanding for what it takes. . ..Sex comes with maturity. Sex becomes better and better with time." Extraordinary lovers noted that the sex they have had across their lifetimes had improved with age and that they were able to optimize their sexual experiences more consistently than earlier in their lives. As one man noted, "It's like somewhere in there, I hit another gear and saw possibilities that I didn't think about before, wasn't aware of missing anything. But I found other... I found more keys on the keyboard."

6. *Do Not Settle for Mediocre Sex*

With experience comes knowledge about what it is that we really want out of sex; as remarkable lovers had developed a good sense of what they wanted, they were less likely to settle for anything else. The lesson here is to seek out sex worth wanting. A focus on the quality of the sex rather than the quantity is to be preferred. One older man stated, "The older I've gotten, the more *particular* I have been in my choice of partners. . .And I am willing to make fewer compromises about what I want sexually as I get older."

7. Wonderful *Memories Breed Anticipation*

As sex therapists know, unfulfilling sexual experiences lead to trepidations about future sex and ultimately, lowered sexual desire (Kleinplatz, 2011). Correspondingly, optimal sexual experiences lead to more such experiences. The shared memory of instances of optimal sexual experiences provides lovers with a point in time from which to create a "platform and springboard for further deepening and expression of optimal sexuality" (Kleinplatz et al., 2009, p. 16).

8. Non-monogamy *Can Be a Doorway to Optimal Sexual Experiences*

Surprisingly, extraordinary lovers are not necessarily monogamous. All remarkable lovers participating in these studies had been partnered for at least 25 years, but many were not monogamous. While not "cheating," that is, while not deceiving their partners, many lovers noted that they were openly non-monogamous. However, even for non-monogamous individuals, their best sexual experiences almost always occurred with their primary partners. As one couple who had been married for 46 years explained, "Great sex began 12 years ago. . .when we went poly."

9. *Optimal Sexuality Need Not Necessarily Be Constrained by Aging, Illness, or Disability*

Although some of the key informants would be considered objectively to be in poor health and to have serious physical impairments (e.g., heart disease, strokes, MS, epilepsy, spinal stenosis, arthritis, hearing loss, COPD, HIV/AIDS, cancer), their subjective perceptions were of sexual well-being. They did not perceive any incongruity between their health status and the quality of their sex lives. Remarkable lovers noted that having a physical disability opened the possibility for more imagination, ". . .a lot of barriers to great sex for able-bodied people as they hold themselves to standards that get in the way of open-mindedness and experimentation." Relational factors were influential in this sense, as one older man said: "With the right partner, I don't need Viagra or Cialis. Without the right partner, drugs won't help!" The lesson to be learned here is that ill health need not interfere with one's capacity for optimal sexual experience.

Clinical Implications

These lessons provide therapists and their clients with opportunities to move away from ordinary or unsatisfying sex towards personal, relational, and erotic growth. The first clinical implication is that *disappointing sex lives can change*; meaning that there may be potential to grow with time and experience. The second clinical implication is that therapists ought to *help patients redefine and reconceptualize "sex,"* which allows patients the ▶ freedom to seek out the most pleasurable activities for them, rather than trying to fit the mold. Therapists could also *encourage clients to say "no" unless they are full of desire*, particularly due to the negative impact on sexual functioning and the risk of incurring dyspareunia when couples engage in sex when not fully aroused. The fourth clinical implication is to *let patients know that attention to emotional intimacy is essential for high quality sex*; for optimal sex to be attained, participants need to feel safe, trusting, and able to be emotionally vulnerable. The emotional connection between partners must be carefully developed and cultivated. Therapists can also assist their clients by *not downplaying disappointment: Help patients aim for sex worth wanting*. Remind clients that their low desire is for lousy sex and that if they are able to foster better connection in sex, then their desire can flourish. Another way to assist patients is to encourage them to forget *natural and spontaneous. Teach clients that sex worth wanting is worth the effort*. If couples hope to extend beyond the caliber of the sex that they are having or have had in the past, then they will need to expend additional effort by attaining more experience and making sex more of a priority. A final and very interesting clinical implication is that ▶ *sexual functioning and optimal sexuality are very different phenomena*. "Full sexual functionality is not *necessary* for optimal sexuality. . .full sexual functioning is not *sufficient* for wonderful sex" (Kleinplatz, 2010, p. 23).

Cross-References

- ▶ Components of Optimal Sexual Experiences
- ▶ Personal Contributions to Optimal Sexual Experiences
- ▶ Relational Contributions to Optimal Sexual Experiences

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Leukemia

► Childhood Cancer

Level of Analysis

► Units of Analysis

Level of Education

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Synonyms

Educational attainment; Schooling

Definition

Education is defined as *"experiences that influence the way people perceive themselves in relation to their social, cultural, and physical environments; a complex and purposeful process for expediting learning"* (Modeste & Tamayose 2004). Level of education is an important determinant of health outcomes. In most biomedical research, it represents educational achievements of a given individual, frequently expressed as years of formal schooling or degrees attained.

Description

Although education is a broader concept than schooling level, health research often relies on the highest educational degree achieved by a person as a measure of level of education. The reason for that is that measuring other aspects of education is difficult. Level of education is one of the major determinants of health, quality of life, and well-being. Not only an individual's own education but also the education of family members may have long-lasting influences on health (e.g., influence of maternal schooling on child health).

A misinterpretation of the level of education concept, particularly relevant to biomedical research, is to equate it with family income or any other indicator of socioeconomic position. Level of education is obviously highly correlated with socioeconomic status, but the concepts are not the same. For instance, there is evidence that level of education is a more important driver of the obesity epidemics than socioeconomic position is (Monteiro, Conde, & Popkin 2001), at least in some low- and middle-income countries (e.g., high-income women with low schooling are more likely to be obese than high-income women with high schooling).

Measuring level of education in biomedical research is challenging, especially because the ways the variable is expressed differ across countries. In several multicenter international studies, a solution to this problem is expressing level of education by the number of years of formally recognized schooling (i.e., the highest degree achieved).

Within country and between countries, variations in levels of education are of interest to health research. There is evidence that despite the gross domestic product of a country, for example, there are extreme differences in health outcomes across levels of education. Levels of education do also vary markedly across low-, middle-, and high-income countries.

Cross-References

- ▶ Quality of Life
- ▶ Well-Being

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Level of Learning Surveys in Sweden

- ▶ Living Conditions, Swedish Surveys

Level of Significance

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Definition

Level of significance is a component to null hypothesis significance testing (NHST). NHST begins with a ▶ null hypothesis (or distribution) which represents a set of known expectations one has about the likelihood of certain events occurring. When a significance test is conducted, a systematic observation is collected and the probability of observing this outcome is determined by referencing its frequency of occurrence in the null distribution (Aron & Aron, 2003).

While it is known that some events are more likely to occur in the null distribution than others, at some point, a decision needs to be made determining whether or not the observed event was likely to have occurred. The level of significance is the decisional demarcation point. In the social sciences, this value is typically set at 5 %, indicating that if the likelihood of the observed event occurring in the null distribution was 5 % or less, then it is concluded that the observed event is *statistically significant*, that it is not likely to have occurred by chance and therefore something made it happen (usually one's experimental manipulation).

If the probability of the observed event happening was greater than 5 %, then it is concluded that what was observed was a common event likely to be found randomly (i.e., the experimental manipulation did not make this happen) (Hurlburt, 2003).

Level of significance is a probabilistic statement denoting the likelihood of something happening, usually, by chance. As such, the possibility always exists that the conclusion drawn is wrong (in the above example, there was a 5 % chance that concluding the observed event did not happen randomly is wrong). As such, more extreme significance levels can be used, such as the 1 % and.01 % levels. These values are also referred to as *alpha levels*. One should avoid the mistake of interpreting levels of significance as effect size estimates. While larger experimental effects will generate more extreme (i.e., less likely to have occurred by chance) observations, the setting of a significance level in the null distribution is also influenced by sample size as well.

Cross-References

- ▶ Null Hypothesis
- ▶ Type I Errors
- ▶ Type II Errors

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Levels of Measurement

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Description

Four levels of measurement first crystallized by Stevens (1946) are generally recognized, though with some debate:

1. *Nominal or categorical* – in which individuals are placed in an exclusive category according to one or more characteristics;
2. *Ordinal* – individuals are ranked on a single criterion, such as their height (from the shortest to the tallest but without their actual height being recorded);
3. *Interval* – the distance between each pair of individuals is recorded on a continuous scale (such as weight in kilograms); and
4. *Ratio* - the nature of one individual is expressed as a ratio of another on the same intervally measured characteristic (such as individual *a* is twice the weight of *b*).

Thus, for example, on a nominal scale New York City contains eight million people and Los Angeles four million; on an ordinal scale, New York is larger than Los Angeles; on an interval scale New York has four million more residents than Los Angeles; and on a ratio scale New York is twice as large as Los Angeles. Which level is used depends therefore on the nature of the phenomenon being measured – you cannot express country-of-origin on an interval scale, for example.

Although to some scholars only the third and fourth levels in this hierarchy are truly quantitative measures (i.e., the data are measured on a continuous rather than a discrete scale), each has its own descriptive statistics. The normal measure of the central tendency (the average) for nominal data is the *mode* – the commonest occurrence among the categories (e.g., at the 2010 UK general election, the modal party voted for was the Conservatives – 36 % of the total); for ordinal data, it is the *median* – for example, the individual who divides the sequence into two equal halves (e.g., if individuals are ranked according to their test scores, half of them have a score larger than the median and half of them have a smaller score); for interval data, the usual measure is the *arithmetic mean*, which is the sum of all scores divided by the number of individuals; the arithmetic mean is also commonly used for ratio data, although others are available, such as the *geometric and harmonic means* (the latter, for example, gives less weight to larger values and is widely used in the calculation of, for example, an average speed).

At each level, it is feasible to use an average for a lower level (with interval data, for example, one can calculate either the mode or the median as well as the arithmetic mean) but one cannot employ an average for a higher level (i.e., you cannot calculate the arithmetic mean for a set or nominal data). Each of those averages also has associated measures of dispersion – such as the inter-quartile range for ordinal data, the standard deviation for interval, and the coefficient of variation for ratio data.

As well as separate descriptive statistics, each measurement level has its own analytical statistical procedures. Within the general family of linear regression models, for example, categorical data can be analyzed using binary and multinomial models, ordinal data with ordered probit models, interval data using ordinary least squares models, and ratio data using logistic regression.

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Leyden Poverty

▶ Subjective Poverty: The Leyden Approach

Leyden School

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Definition

The Leyden School was a small research group at Leiden University (The Netherlands) that worked on ▶ happiness economics in the period 1972–1982. Their basic research vehicle was the ▶ Income Evaluation Question (IEQ) in which respondents were asked to report the income levels that they associated with verbal descriptions such as "a *good* income" or "a *bad* income." Through the IEQ, researchers in the Leyden School estimated the ▶ individual welfare function (Van Praag, 1971, 1976).

Description

This is the name, which has been given to a small research group at Leiden University in The Netherlands that worked on happiness economics avant la lettre in the period 1972–1982. The group was headed by Bernard M.S. Van Praag, while important contributors were Arie Kapteyn, Aldi Hagenaars, and Tom Wansbeek. Later on, it became the name of the specific approach of the Leyden group. Their basic research vehicle was the so-called ▶ Income Evaluation Question (IEQ) in which respondents were asked to identify the income levels which they associated with verbal descriptions such as "a *good*" or "a *bad*" income for my household. In this way, it was possible to identify six or seven different levels for each individual. Through the IEQ, researchers in the Leyden School estimated the ▶ individual welfare function (Van Praag, 1971, 1976; Van Praag & Ferrer-i-Carbonell, 2004; Van Praag & Kapteyn, 1973). Notice that this question module differs from the now usual satisfaction questions, where respondents are only asked to evaluate their *own* income or their own life situation in general. The modern approach is more general, as it is not exclusively focusing on financial satisfaction.

The Leyden group collected data sets of thousands of responses, partly gathered in European surveys, and compared the answers to determine the effect of income variations, variations in family size, and other variables on the responses to the IEQ. They were ahead of mainstream economics in the 1970s by setting up large-scale surveys where they assigned information value to subjective individual data. Those data were analyzed by regression methods in order to estimate equations and effects of objective individual circumstances (such as family size, age, job security, education, and effects of the reference group) on the respondents' feeling of satisfaction with their income. The Leyden School derived important insights for *family equivalence scales* (Plug & Van Praag, 1995), for the estimation of the *subjective poverty lines* (Goedhart, Halberstadt, Kapteyn, & Van Praag, 1977), and for the discovery of concepts such as *the* ▶ *preference drift* and the ▶ *reference drift* mechanisms. See Van Praag (1985).

The results of the Leyden School have been grossly ignored by contemporary mainstream economists. This was also caused by the fact that the group frequently gave a cardinal interpretation to their results, where they derived a cardinal utility function of income from their data. Nowadays, this cardinal approach becomes more common in modern happiness economics. However, most of the Leiden results do not need this cardinal assumption and remain valid in an ordinal context (see Van Praag and van der Sar (1988)).

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LGBTQ Intimate Partner Violence

► Same-Sex Partner Violence

Liabilities

► Debt

Liberal Democracy

► Conceptualizing Democracy and Nondemocracy

Liberalism

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Definition

"Liberalism" is the term for a broad family of political theories united by the belief that the protection or promotion of liberty is the primary purpose of the government.

Description

Political philosophers use the term "liberalism" to refer to a broad family of theories united by a deep commitment to the ideal of individual liberty. (Gaus, 2003) For liberals, the protection or promotion of individual liberty is the primary purpose of government. At the extreme, it is thought to be the *sole* legitimate purpose of government. But even those liberals who accept a somewhat more expansive vision of the scope of legitimate governmental activity will view the protection of liberty as a severely limiting *constraint* on that scope. Though certain policies might contribute to human happiness or economic growth, the liberal will nevertheless reject them if they cannot be pursued without violating basic human freedoms.

The philosophy of liberalism received one of its most eloquent expressions in John Stuart Mill's 1860 classic, *On Liberty*. In the first chapter of that work, Mill set out a principle that many since have taken to be definitive of the liberal view of ► freedom:

> The only purpose for which power can be rightfully exercised over any member of a civilized community, against his will, is to prevent harm to others. His own good, either physical or moral, is not a sufficient warrant. . .The only part of the conduct of any one, for which he is amenable to society, is that which concerns others. In the part which merely concerns himself, his independence is, of right, absolute. Over himself, over his own body and mind, the individual is sovereign. (Mill, 2003)

Mill referred to this principle – later known as the "harm principle" – as the "one very simple principle entitled to govern absolutely the dealings of society with the individual in the way of compulsion and control." On reflection, of course, the principle turns out to be not so simple after all, especially when it comes to determining what does and does not constitute a "harm" of the relevant sort – clubbing someone over the head, clearly, but what about insulting someone, or unintentionally emitting small

amounts of toxins into the air they breathe (Feinberg, 1984)? But Mill's principle does clearly commit liberalism to rejecting two alternative principles as justification for coercive government action: the principles of legal moralism and legal paternalism. The former says that restrictions on an individual's liberty can be justified in order to prevent that individual from acting in a way that is harmless but nevertheless somehow immoral; the latter says that restrictions can be justified in order to prevent an individual from acting in a way that is harmful to his or her own self.

The liberal opposition to paternalism is based on her commitment to individual freedom. But even for the liberal, that commitment is not absolute and unqualified. Human beings are entitled to freedom, according to the standard liberal story, because they are autonomous. But not all human beings are fully autonomous. Mill makes explicit allowance for paternalistic restrictions of liberty in the case of children, and liberals have typically made similar exceptions for the insane or the severely retarded. However, while liberals have been clear that standard liberal principles of noninterference do not apply to such classes of persons, they have been much less clear about the sorts of principles that *should* apply. The problem of children in a liberal society, in particular, has proved to be one of the most serious and intractable problems of liberal political theory (Archard & Macleod, 2002).

But the problem of paternalism is not confined to marginal cases. For even otherwise normally functioning adults will fail to achieve full autonomy on particular occasions or in particular contexts. And when they do, liberals must face the question of whether paternalistic interference is permissible. And almost all liberals grant that it *sometimes* will be. Even John Stuart Mill thought as much. In a famous example, Mill states that:

> If either a public officer or any one else saw a person attempting to cross a bridge which had been ascertained to be unsafe, and there were no time to warn him of his danger, they might seize him and turn him back without any real infringement of his liberty; for liberty consists in doing what one desires, and he does not desire to fall into the river. (Mill, 2003)

Mill continues, however, by claiming that if the person really *does* want to fall into the river or, more plausibly, is willing to take on the *risk* of falling into the river after you have informed him of the danger, then you must let him go. So the paternalism endorsed here is of a relatively weak sort. It is what later theorists have come to call *soft paternalism* and holds that one is permitted to interfere with another person's liberty for her own good *only* if she is acting out of ignorance or involuntarily. Most liberals reject *hard paternalism*, which holds that interference with even voluntary and informed actions is permissible in order to prevent an agent from causing herself harm (Sartorius, 1983).

Liberals also tend to be *weak paternalists* as opposed to *strong paternalists*. The former sort of paternalism allows interference with the means chosen by an agent to achieve her ends in the event that those means are unlikely to actually achieve the agent's ends. The latter allows interference with the pursuit of ends themselves and is typically seen by liberals as involving a deeper and impermissible interference with individual autonomy (Sartorius, 1983). Finally, so-called libertarian paternalism would appear to be consistent with liberalism, at least insofar as it advocates only noncoercive modification of individuals' choice sets in order to "nudge" individuals into making choices that are less likely to be self-harmful and more likely to be self-beneficial (Thaler & Sunstein, 2009). But some libertarian critics worry that in its application, the theory's paternalistic and libertarian impulses will come into conflict and that various theoretical and practical pressures will lead such conflicts to tend to be resolved in favor of the former rather than the latter (Rizzo, 2009).

Most liberals also reject the claim that it is the proper business of government to enforce morality, at least when it comes to those parts of morality that are not aimed at preventing individuals from harming each other (Feinberg, 1988). A liberal may believe that gambling, drinking,

and trading sex for money are inherently wrong (*apart* from their harmful effects on the persons involved or on third parties). But a thoroughgoing liberal will deny that the wrongfulness of these activities is a legitimate reason for legally prohibiting them.

Sometimes, the reasons for this denial are purely pragmatic in nature. Our beliefs about which kinds of things are immoral and which are not might be mistaken. The legal prohibition of vice might not be effective in actually suppressing it and might even create incentives for even more destructive forms of immoral behavior such as those that occur in black markets.

But liberals sometimes reject legal moralism for a deeper and more philosophical reason. It is unjust to legally prohibit an activity because of our belief in its immorality, they say, because it is not the business of government to enforce one particular view of morality over and above all others. A liberal society is marked by what John Rawls called a permanent condition of "reasonable pluralism," which means that a diversity of conflicting and irreconcilable but *reasonable* moral beliefs is the normal result of free inquiry (1993). Because the diversity of beliefs is reasonable, many liberals believe that it would be unjust to use the power of the state to suppress it, or to promote one particular reasonable moral view to the detriment of other equally reasonable ones.

A concern to respect reasonable pluralism is, thus, one reason for believing in the doctrine of *liberal neutrality*. This doctrine has been formulated in various ways by different authors but essentially holds that the state should be neutral between rival understandings of the good life by, for instance, refraining from justifying its actions by appealing to moral beliefs that are subject to reasonable disagreement. Most liberals endorse some form of neutrality, though some liberals such as Wall (1998) reject neutrality in favor of the doctrine of *perfectionism*, which advances an objective account of the good and holds that there is no general principle that forbids states from directly promoting that good even if the nature of the good is subject to reasonable disagreement.

Liberals are united in a commitment to individual liberty. But there is significant disagreement among liberals regarding what exactly liberty is and how states should go about protecting or promoting it. For example, ever since Isaiah Berlin's famous essay (1990), liberals have debated whether liberty should be characterized in primarily negative or positive terms. Negative liberty is generally thought of as freedom *from* something—specifically, freedom from certain kinds of externally imposed obstacles, especially those imposed by other human beings. Positive liberty, in contrast, involves the ability to act in a way that is in accordance with one's autonomous and/or truly rational desires.

The distinction has important implications since an individual can be free in the negative sense while being quite unfree in the positive sense. Someone who is protected from aggression by others, for instance, might have perfect negative freedom. But if she is unable to act as she autonomously wishes to act because she is too poor, too sick, or otherwise disabled, she will lack a significant degree of positive freedom. Liberal political philosophers then face an important question: Is the business of government merely to protect individuals' negative liberty, or do they have an obligation to promote their positive liberty as well?

Not all scholars believe that commitments to negative or positive liberty are mutually exclusive options (Schmidtz & Brennan, 2010). But the question of which should be the primary focus of public policy is rendered more difficult by the fact that promoting positive liberty for some persons often seems to require interfering with the negative liberty of others. Governments can attempt to promote the positive liberty of the poor by providing them with subsidized education, health care, and cash transfers. But the funds for these services must be obtained through taxation, which seems to involve the violation of taxpayers' negative liberty, insofar as it is obtained partly by threats of fines and jail time. Libertarians thus generally

believe that the sole legitimate purpose of government is the protection of negative liberty and, therefore, that transfers of the sort described above are illegitimate. Liberal egalitarians and other non-libertarian liberals believe either that the infringements of negative liberty are justified, either by the democratic process by which they were generated or by the gains in positive liberty they produce, or that taxes are not really infringements of negative liberty at all. Narveson and Sterba (2010) provide a useful overview of this important intra-liberal debate.

Cross-References

- ▶ Ethics
- ▶ Freedom
- ▶ Liberty

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Liberty

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Synonyms

Freedom

Definition

Liberty is the main principle of ethics and one of the basic social values of the modern world. A free individual will is a necessary precondition of a moral choice. One cannot act responsibly without possessing a free will and the opportunity to choose freely among different paths of action in a given situation. If human action is predetermined by some outside factor, no room is left for morality (determinism). As a social value, however, liberty is the main principle of societal organization of the modern world, covering a wide range of issues of social life. Economic, political, and cultural problems will be best dealt with, if people are left free to make their own autonomous choices instead of being subjected to different forms of coercion by others.

Description

Freedom has become a rallying cry of many Western social movements at least since the eighteenth century. However, a conceptual discussion about the precise meaning of the term has begun more recently. To what extent liberty presupposes just one's being left alone by others, or whether it demands an active involvement of others (e.g., the state) in order to secure an individual's capability to freely achieve his ends, is a crucial question here.

Systematic discussion on this issue was initiated by Isaiah Berlin's article "Two Concepts of Liberty" (Berlin, 1969). It distinguishes prominently between positive and negative concepts of freedom – freedom *from* and freedom *for*. Although several authors have contested the adequacy of this distinction, it is still widely used for analytical purposes.

Purely negative freedom means absence of external constraint or coercion. One can be said to be free, if his actions are not forced upon him or others are not preventing him/her to commit actions of his own choosing. The locus classicus of this understanding of freedom is John Stuart Mill' s essay "On Liberty" (Mill, 2008), which defends individual's freedom as a sphere of noninterference. No one has a right to interfere with the freedom of another, if only in the case of preventing harm to others; paternalistic reasons are not sufficient for the limitation of freedom of another person. However, even for Mill individual freedom ultimately turns out not to be purely negative. The absence of restraints is not a goal in itself. It is necessary in order to develop an individuality, which forms the basis of social progress in science, as well as in ecoomy, religion, and arts. Liberty is a precondition for the moral development of an individual.

According to Berlin's definition, this goal-oriented freedom must be called positive. In this conception the core idea of freedom is not the absence of coercion or constraint, but, rather, the possession of means to achieve aims set by oneself. No external obstacles to an action may be present; however, if an individual doesn't have social power and physical means to achieve his aims, his liberty is useless. For example, an individual may have no external restraints getting access to higher education; however, if he has no sufficient resources for it, his goal remains unattained. Freedom in this positive sense is synonymous with "being able": one can be said to be free, only if he is able to achieve the aims freely chosen by him. Negative freedom opposes various social constraints to individual action; positive freedom, on the contrary, demands certain social and economic preconditions for free and autonomous choice (Taylor, 1979).

Positive freedom has been often criticized for being too paternalistic. Indeed, most conceptions of positive freedom try to determine which particular aims are worth achieving for an individual in order to be "really" free. Various collectivist and socialist approaches to freedom imply that an individual may be "forced to be free" (Rousseau, 1993) by the society. Since such an approach contradicts the very principle of individual freedom, it seems that the core of the concept of freedom is still negative. Although freedom may involve certain positive action of the state (e.g., legal protection of individual rights), free action must be clearly separated from the provision of means and abilities. If freedom (e.g., "I am free to become a world-class singer") is broadened to include also all positive aspects (e.g., "I am able to become a world-class singer"), the very concept seems to lose any coherent meaning. However, it seems that freedom still includes certain positive aspects that cannot be ignored. For example, the definition of human security includes "freedom from want" and "freedom from fear" as preconditions for living in dignity (United Nations Development Programme, 1994). These freedoms presuppose not just absence of constraint but also certain economic and political institutions that can ensure these freedoms. Moreover, reliance on pure negative freedom in extreme cases might lead to full-scale exploitation of the poor and powerless by the rich and powerful. Such exploitation may be regarded as compatible with pure negative freedom, provided the exploitation is based on mutual consent, which is formally free. Nevertheless, such exploitation might be seen as highly undesirable in a free society, and this in turn justifies measures of positive social policy intended to prevent such exploitation. If freedom means only freedom to sleep under bridges, to beg in the streets, and to steal the bread, it becomes

meaningless. In short, negative and positive aspects of liberty seem to exist in a dialectical relation, whereby the negative core of the concept, in order to remain meaningful, needs constant positive corrections.

An important debate on the concept of liberty concerns the individual autonomy (Dworkin, 1988; Frankfurt, 1971). Individual freedom in this sense involves not only the possibility of choosing among several types of action but also the self-determination, that is, the opportunity to give oneself higher-order principles and to obey them voluntarily. For Immanuel Kant, for example, human morality itself is founded on the self-imposition of a universal law, the categorical imperative (Kant, 1998). Freedom in this sense presupposes that individual's capability of choosing among different options is subjected to autonomously chosen principles allowing an individual to live the life of his own choice. Autonomy presupposes that reasons, desires, and inclinations that form the basis of individual choices are independent and authentic rather than imposed by other persons or obstacles. Moreover, the assumption that other people are autonomous and self-governing in their choices forms the basis of interpersonal morality. No adult and mentally sound person can be treated as if he couldn't make free and autonomous choices and therefore should be subjected to paternalism and supervision. This is an important issue in applied ethics, especially in medical ethics, where the principles of informed consent and paternalism are discussed (Clark, 1988). The opportunity to make informed decisions is regarded as one of the basic elements of good life.

Individual liberty is one of the main social values of a well-ordered society. However, it is not the *sole* social value to be respected and cherished by such a society. Individual liberty always exists in a mutual relation with the principle of social cohesion. A good life in society doesn't presuppose just individual liberty but also a certain amount of shared norms of social solidarity. Individual liberty can remain among the guiding principles of modern democracies, only if its absolutization doesn't lead to new forms of social exclusion, dependence, and discrimination.

Cross-References

- ▶ Government
- ▶ Happiness
- ▶ Ideology
- ▶ Individualism, an Overview
- ▶ Nationalism
- ▶ Political Empowerment

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Libido

- ▶ Desire, Sexual

Life as a Whole, Satisfaction with

- ▶ Satisfaction with Life as a Whole

Life Attitude Profile

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Definition

In its present, revised, form, it is a 48-item self-report multidimensional measure of discovered meaning and purpose in life and the motivation to find meaning and purpose in life.

Description

The original Life Attitude Profile (LAP) was developed by Reker and Peacock (1981) as a self-rating questionnaire consisting of 56 items. Each item was rated on a 7-point Likert scale ranging from "strongly agree" to "strongly disagree." Subsequent modifications to the original form were made, while a number of refinements based on a combination of theoretical and factor analytic procedures resulted in a 48-item instrument entitled the Life Attitude Profile-Revised (LAP-R) (Reker, 1992). Six dimensions are measured by the LAP-R: Purpose (PU; 8 items) that refers to having life goals, having a mission in life, and a sense of direction in one's life (e.g., "I have a mission in life that gives me a sense of direction," "In my life I have very clear goals and aims," "I have discovered a satisfying life purpose"); Coherence (CO; 8 items) that refers to having a consistent understanding of self, others, and life (e.g., "I have a clear understanding of the ultimate meaning of life," "In thinking of my life, I see a reason for my being here"); Choice/Responsibleness (CR; 8 items) characterized by the perception of having personal agency in directing one's life (e.g., "My life is in my hands and I am in control of it," "I determine what happens in my life," "When it comes to important life matters, I make my own decisions"); Death Acceptance (DA; 8 items) where a person has achieved death transcendence (e.g., "Some people are very frightened of death, but I am not," "Since death is a natural aspect of life, there is no sense worrying about it"); Existential Vacuum (EV; 8 items) that refers to having a lack of meaning, goals, and direction in life ("I find myself withdrawing from life with an 'I don't care' attitude," "I feel the lack of and a need to find a real meaning and purpose in my life"); and Goal Seeking (GS; 8 items) characterized by the search for new and different experiences and an eagerness to get more out of life (e.g., "I hope for something exciting in the future," "I am determined to achieve new goals in the future"). Two composite scales have also been developed: the Personal Meaning Index (PMI) derived by summing the PU and CO dimensions and the Existential Transcendence (ET) derived by summing the scores on the PU, CO, CR, and DA and subtracting the scores on EV and GS. Instructions for the LAP-R ask respondents to indicate the extent to which they agree or disagree with each statement that describes opinions and feelings about themselves and life in general. The LAP-R has been translated from English into many languages including German (Mehnert & Koch, 2008), Greek (Anagnostopoulos, Slater, Fitzsimmons, & Kolokotroni, 2011), and Turkish (Erci, 2008).

Reliability

▶ Internal consistency reliability, based on the original Canadian data set (N = 750), was satisfactory. Cronbach's alpha coefficients ranged from 0.79 for the EV to 0.86 for the PU scale. Test-retest stability coefficients (4–6-week interval) were highly satisfactory, ranging from 0.77 for the CR to 0.87 for the PU scale (Reker, 1992).

Convergent Validity

Correlations with standardized measures of one's meaning and purpose in life were on average strong. For example, PU, CO, CR, and EV scales had significant correlations, ranging (in absolute value) from 0.36 to 0.78, with Purpose in Life Test, Lodzinski's Academic Goals Inventory, Ryff's Integrity, Reker's Perceived Well-Being Scale/Psychological Well-Being, and Wood's Life Satisfaction Index-Z (Reker, 1992).

Discussion

The LAP-R is a reliable and valid measure of current and future meaning and purpose in life. It is predictive of a large number of outcome variables including psychological well-being, ▶ life satisfaction, and the absence of feelings of depression and alienation. LAP-R has been used to study sociodemographic and psychological factors associated with psychological distress in Australian patients with cancer. Higher global meaning and motivation to find meaning were associated with lower psychological distress (Lethborg, Aranda, Cox, & Kissane, 2007). In American caregivers of individuals with Parkinson's disease, global meaning (measured using the LAP-R) was related to psychological well-being (Konstam et al., 2003). Meaning in life (measured using the LAP-R) has been found to mediate the impact of breast cancer (functional status) on the psychological well-being of patients (Meraviglia, 2006). These findings lend support to the notion that the LAP-R dimensions may tap aspects of ▶ quality of life.

Cross-References

- ▶ Convergent Validity
- ▶ Internal Consistency Reliability
- ▶ Life Satisfaction
- ▶ Meaning in Life
- ▶ Quality of Life
- ▶ Test-Retest Reliability

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Life Change Stress

▶ Stressful Life Events

Life Changes and Caregiving Outcomess

▶ Bakas Caregiving Outcomes Scale

Life Closure Scale

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Definition

A measurement of cognitive and affective strategies based upon life values and beliefs that promote psychological adaptation in dying persons.

Description

The *Life Closure Scale* (LCS) was tested initially (Dobratz, 1990) on a sample of 20 hospice patients with a diagnosis of 6 months or less to live. Limited by the sample size, the LCS was retested with a larger sample of 113 subjects who also were diagnosed with terminal illness (Dobratz, 2004a). In order to reduce testing fatigue in this vulnerable population, the LCS was further reduced to a 20-item measurement tool. For the 20-item tool, a Cronbach's alpha of 0.87 was computed for the total scale, and Cronbach's alphas of 0.80 and 0.82 were computed for the self-reconciled and self-restructuring subscales, respectively (Dobratz). The LCS was designed as a five-point Likert-type scale with a format that ranges from one (a little of the time) to five (most of the time), with higher scores on the LCS denoting increased levels of psychological adaptation.

The LCS was developed to measure an outcome of psychological adaptation in hospice and ▶ palliative care populations across a wide spectrum of terminal illness. At the time of the LCS's initial development (Dobratz, 1990), a research review concluded that quality of life (QOL) at the end of life (EOL) is a state of ▶ subjective well-being or psychological adaptation with two existential dimensions: finding meaning and maintaining self-integrity. These two separate domains can be measured by items that address eschatological and philosophical beliefs about derived meaning and life purpose (self-reconciled subscale) and cognitive and affective psychological strategies that dying persons use to maintain ▶ self-integrity (self-reconciling subscale). Factor analysis in later testing (Dobratz, 2004a) confirmed the independence of two factors that represent theoretical meanings of contentment (self-reconciled) and contention (self-restructuring). Along with reliability, construct validity for the LCS was established in both testing sessions.

The theoretical meaning of contentment (self-reconciled) was interpreted as "finding meaning in the face of one's dying" (Dobratz, 2004a, p. 58). The self-reconciled subscale's items of "life being worthwhile," "feeling that life is still worth living," and "feeling peaceful and serene" supported a dimension of meaningful existence. As asked by an item, "feeling that your faith will see you through," and by the previous items, the self-reconciled domain confirmed that EOL meaning and purpose is guided by "religious and philosophical beliefs" (Field & Cassel, 1997, p. 79). As physical losses mount, and with end-of-life QOL more related to overall ▶ psychological well-being (Waldron, O'Boyle, Kearney, Moriarty, & Carney, 1999), the self-restructuring subscale represented an "inner psychological struggle that implies difficulties in maintaining self-integrity" (p. 59). Items such as "feeling overwhelmed by everything," "feeling that nothing has worked out for you," and "feeling afraid to be alone" point to existential distress and fear of one's loss of self.

When they evaluated QOL instruments that are used in palliative care, the LCS was included, and Albers et al. (2010a) determined that existing tools with good content validity should take preference over new instrument development. Another review that focused on the content of spiritual items contained in QOL measures in EOL populations concluded that the LCS was linked to ▶ psychological well-being and not spiritual well-being (Albers et al.). In an earlier review of QOL measures that are used with hospice and palliative care populations, the LCS was classified as a measure of existential and/or psychological aspects (Jordhoy et al., 2007). While yet another review of EOL measures (Mularski et al., 2007) included the LCS as a measure of EOL spirituality. With conceptual definitions of spirituality that include a dimension of meaning and purpose (Sessanna, Finnell, & Jezewski, 2007; Vachon, Fillion, & Achille, 2009), Jordhoy et al.'s classification of the LCS as a measure of existential and/or psychological aspects most accurately reflects its domains. As recently referenced in Selman, Harding, Gysel, Speck, and Higginson's (2011) review of spiritual measures used in palliative care populations, "psychospiritual states may, in fact, more accurately reflect patients' own views of

spirituality" (Dobratz, 2004b, cited in Selman et al., 2011).

With mean LCS scores approximating a range found in non-ill populations (Dobratz, 1995), the LCS supports that dying persons find meaning and purpose and "that it is possible for psychological adaption to exist, even in the face of terminal illness" (p. 85). At the same time, the LCS has the potential to differentiate clinical populations, with higher scores found in a group of acquired immunodeficiency syndrome (AIDS) patients as compared to other terminal illnesses (Dobratz, 2004c). Although further testing is needed, this latter finding supports research by Lee et al. (2001) and Murphy, Albert, Weber, Del Bene, and Rowland (2000) who both found significant correlations of existential components that included ▶ psychological well-being and ▶ spirituality in AIDS patients.

Cross-References

- ▶ Palliative Care
- ▶ Psychological Well-Being
- ▶ Quality of Life
- ▶ Self-Integrity
- ▶ Spirituality
- ▶ Subjective Well-Being
- ▶ Well-Being, Spiritual

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Life Course Transitions

- ▶ Life Events

Life Domain Satisfaction in Portugal and France

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Synonyms

Appraisal of life questionnaire

Definition

Life domain satisfaction refers to satisfaction with life in different domains of life (e.g., love life, family life, and leisure life).

Description

Ruiz Paiva et al. (2009) compared life domain satisfaction scores observed in Portugal and in France. These countries are both part of the European Union, but they are very different, the one from the other, in terms of economic development. At the time of the study, the gross national product per capita was estimated at about US$11,000 for Portugal and about US$26,000 for France, and studies on elderly populations in Portugal (e.g., Paúl, Fonseca, Martín, & Amado, 2003) have shown that many elderly Portuguese appear to be very financially deprived, to the point of having no resources to dedicate to leisure and thus tend to feel very isolated and lonely.

The Portuguese sample was a convenience sample that was composed of 1,111 participants (625 females and 486 males, aged 17–85). It was formed of four subsamples of 287 adults aged 17–26 years, 370 adults aged 27–44 years, 260 adults aged 45–60 years, and 194 elderly persons aged over 60 years. All participants came from the north of Portugal. They were comparable in terms of socioeconomic status and general background. The elderly people lived at home. The data were gathered in 2004 and 2005. The French sample was issued from a study by Salvatore and Muñoz Sastre (2001). It was composed of 500 participants who lived in France's central region. These participants were divided into the same four age groups; that is, 110 participants were in the younger adults group, 88 in the first middle-aged adults group, 125 in the second middle-aged adults group, and 177 in the elderly persons group. The data were gathered in 1999.

Two questionnaires were used: (a) the *Appraisal of Life Questionnaire* created by Salvatore and Muñoz Sastre (2001) and (b) the *Life Satisfaction Scale* (Diener, Emmons, Larsen, & Griffin, 1985). The first questionnaire consisted of 51 statements related to current conditions or states in eight specific domains'/areas (physical body, love life, family relationships, friends, work (or schooling), financial situation, leisure activities, and spiritual life) and from six different points of view (acceptance, autonomy, mastery, purpose, personal development, and positive relationships). The exact wording of each statement differed slightly according to the participant's personal situation. For example, the "accepting one's job" statement was worded (a) "I accept my current studies" when the participant was still studying, (b) "I accept my current job" when the participant was currently working, or (c) "I accepted my job" when the participant was retired. The participants answered by indicating on a 10-point scale (1–10) the extent of their agreement with each statement. The two anchors of the scale were "Total disagreement" (left anchor) and "Total agreement" (right anchor).

Overall, the level of physical autonomy (e.g., striving to maintain and improve one's physical self) was not significantly different from one country to the other (6.52 and 6.71). Among the Portuguese, however, the score was linearly decreasing as a function of age but not to the same extent among females and among males. It was slightly decreasing as a function of age among males (from 6.83 to 6.19) but strongly decreasing as a function of age among

females (from 7.01 to 4.56). In contrast, among the French, the physical autonomy score was stable across age (about 6.60). Regarding love life (e.g., having a harmonious relationship with one's spouse), the only difference observed was, in both countries, associated with gender. The love life score was higher among males (7.50) than among females (7.00).

Overall, the level of satisfaction with family life (e.g., accepting the types of relationships one has with the extended family extended) was not significantly different from one country to the other (8.12 and 7.92). Among the French, however, the family life score linearly increased as a function of age (from 7.36 to 8.40). Among the Portuguese, in contrast, the family life score first increased as a function of age (from 7.81 to 8.36 to 8.39) and then decreased (from 8.39 to 7.57). The social life score (e.g., having an impact on friends and acquaintances) was no more significantly different from one country to the other (6.39 and 5.99). In both countries, however, the social life score linearly decreased as a function of age, and the decrease was stronger among the Portuguese (from 7.20 to 5.15) than among the French (from 6.58 to 5.84).

Regarding occupational life (e.g., accepting one's current job), there was a difference between countries. The Portuguese score (7.12) was lower than the French one (7.88). In addition, the evolution of the score with age was very different from one country to another. Among the Portuguese, the occupational life score linearly decreased as a function of age (from 7.46 to 6.04). Among the French, the occupational life score linearly increased as a function of age (from 7.06 to 8.47). Regarding financial autonomy (e.g., being able to manage one's financial situation), there was also a difference between countries. The Portuguese score (7.13) was lower than the French one (7.52). In addition, the evolution of the score with age was not the same from one country to another. Among the French, the financial autonomy score linearly increased (from 5.90 to 8.30). Among the Portuguese, the financial autonomy score first increased (from 6.41 to 7.58) and then decreased (from 7.58 to 7.56 to 6.67) as it did for family life. Overall, the leisure life score (e.g., being able to manage one's leisure opportunities) was not different from one country to the other (7.49 and 7.37), but the evolution of the score with age was very different from one country to another. Among the Portuguese, the leisure life score decreased as a function of age (from 7.79 to 6.92). Among the French, it increased as a function of age (from 7.17 to 7.76).

Finally, the overall satisfaction with life score was not different from one country to the other (4.81 and 4.94 on a seven-point scale), but the evolution of the score with age was very different from one country to another. Among the Portuguese, the overall satisfaction with life score linearly decreased as a function of age (from 4.95 to 4.58). Among the French, it linearly increased as a function of age (from 4.76 to 5.11). Overall satisfaction with life was more strongly correlated with financial autonomy, occupational life, and leisure life scores, which are directly connected with economical development among the Portuguese than among the French. Also, the physical autonomy score was also more strongly associated with overall life satisfaction among the Portuguese than among the French. This is probably due to the fact that owing to poor socioeconomic conditions, the physical health of certain Portuguese participants was not good at all.

As could be expected from the economic situation of the two countries, Portuguese scores as regards financial autonomy and occupational life were lower than French scores. In addition, regarding the financial score, a nonlinear relationship with age was found. An increase was observed from young adult age to adult age, and a decrease was observed from adult age to older age, and this was also observed regarding the family score. Regarding the occupational score, this is a clear linear decrease as a function of age that was evidenced in the Portuguese sample, and this was also observed regarding the leisure score. In addition, a strong decrease in the physical autonomy scores among

Portuguese females, with elderly females showing surprisingly low scores (lower than the midpoint of the response scale), was observed.

As a result of these multiple decreases as a function of age, a clear decrease in overall satisfaction was also present, and the association between domain satisfaction and overall satisfaction was stronger among Portuguese than among French. As shown by Cheng (2004), as people age, they usually tend to progressively reduce their aspirations, which partly compensates for inescapable decrements in resources and capacities. Among Portuguese elderly persons, however, and in contrast to what was observed among the French, these decrements, notably regarding financial resources and social relationships, were so abrupt that compensation is no longer possible, and a trend towards progressive dissatisfaction with life was clearly observed. This specific finding adds to the controversy regarding the relationship between age and satisfaction with life. It tallies with previous findings by Chen (2001) and Freund and Baltes (1998), obtained in cross-sectional studies, which show a negative relationship between age and satisfaction, and with previous findings by Lang and Heckenhausen (2001) showing a curvilinear relationship. In their longitudinal study, Mrozeck and Spiro (2005) also found a curvilinear relationship between age and satisfaction with life.

Apart from the study conducted by Ruiz, only one additional study that compared life satisfaction between people living in Portugal and people living in France can be reported, although this study was not about life domain satisfaction and only involved Portuguese nationals Neto (1995). This study compared overall life satisfaction (measured using the SWL scale) observed among 519 Portuguese youth residents in Paris, whose parents had migrated to France 10 years ago or more, and 600 Portuguese youth living in Oporto. Regarding overall life satisfaction levels, the young Portuguese living in France did not significantly differ from young Portuguese who have never migrated, and no gender differences were found in any of the samples. Among the young Portuguese living in France, (a) Catholics that attended the church on a regular basis were more satisfied with life than those who did not, (b) members of associations of immigrants were more satisfied with life than nonmembers, and (c) those who considered themselves as "French" were more satisfied with life than those who did not considered themselves as French. Other important predictors of overall satisfaction were loneliness and perceived state of health. These findings show that a majority of young Portuguese migrants adapt well to their new societies, despite difficulties in meeting the demands of cultural changes and the challenge of living in two cultures.

Cross-References

- ▶ Cross-Cultural Comparison
- ▶ Family
- ▶ Health
- ▶ Leisure
- ▶ Love
- ▶ Porto City (Portugal), Quality of Life

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Life Event Stressors

► Stressful Life Events

Life Events

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Synonyms

Life course transitions; Life transitions

Definition

Major events that may occur in people's life, which alter their role, position, and/or resources.

Description

Life events are broadly defined as major events in people's lives that alter their role, position, and/or resources. The list of potential life events that people can experience in their lifetime is daunting and includes the following events (non-exhaustive): marriage, divorce, death of a loved one, birth of a child, migration, a new job, promotion, job loss, ► unemployment, illness onset, ► disability, and retirement. In sociological research, a number of life events are referred to as life course transitions, as some events mark turning points in people's lives; for instance, marriage marks entering the role of being a husband/wife.

Life events are studied in many disciplines that touch upon the life course, ranging from sociology, demography, economics, and psychology to epidemiology. Life events have been associated with positive and negative effects on outcomes ranging from income, self-rated health, and depression to ► life satisfaction/► subjective well-being. Given the generality of the term "life event," it goes beyond this entry to discuss the determinants of life events in any detail. It suffices to say that the occurrence of a particular life event varies by many individual and contextual characteristics (Hatch & Dohrenwend, 2007; Turner, Wheaton, & Lloyd, 1995). It is not possible to make general statements about the effects of life events either, as the effects differ by event, studied outcome, and over the short and long term (George, 1993). This entry will first describe the type of research into life events, second shortly discuss the (negative) consequences of life events that received a lot of attention in research (viz., divorce, ► disability, and job loss and ► unemployment), and third discuss avenues for future research.

Research Strands

Broadly speaking, two strands of research investigate life events. The main approach taken by research in sociology and economics is to focus on one life domain and one transition at a time. For instance, there is an abundance of research that investigates the impact of divorce (see for a recent overview Amato, 2010). Such research typically looks at short- and long-term effects of transitions and considers positive as well as negative consequences (see ► Marital Status Influence on Satisfaction/Happiness). Research into the life course, however, shows that events in different domains are interconnected; a change in one domain of life may lead to or

at least coincide with a change in another domain. For example, the relationship career and work career are intertwined; a common finding is that divorce heightens the risk of unemployment (Charles & Stephens 2004; Covizzi, 2008) and vice versa (Hansen, 2005).

A second approach, which is more often applied in public health and stress research, is to consider a range of life events simultaneously by constructing cumulative measures of life events (Kessler, 1997; Lantz et al., 2005; Turner et al., 1995). This approach is interested in a broader set of life events. For example, they also include more specific events like "one's partner had an affair" or "one was a victim of a crime." Unfortunately, the main focus is usually on "negative" life events and on possible negative consequences on the short term, which may lead to a less comprehensive understanding. The focus on negative life events occurs in part because such cumulative risk scores are often used as a predictor for the onset of psychiatric disorders. The cumulative life event approach has the merit that life events are no longer viewed in isolation. A disadvantage, however, is that rather different events, such as divorce, parental death, and being a victim of a crime, could be treated as equivalent. Another limitation is that the timing of life events is often not clear: *Lifetime* events are sometimes mixed with more *recent* events to create measures of total lifetime stress (e.g., Reynolds & Turner, 2008), which complicates the interpretation of the findings. More importantly, in the cumulative life events approach, a number of strains and events (e.g., financial problems, partner had an affair) that are associated with negative life events (e.g., job loss and divorce) are treated as life events too (see, e.g., Turner et al., 1995). This practice may inflate the count of life events.

Divorce

One of the most studied life events is the impact of divorce in the lives of children and adults. Divorce is associated with negative consequences, as a divorce may lead to a loss of available resources and because the divorce process can be disruptive and stressful. Children whose parents divorced have lowered well-being compared to children who grew up in intact families (Amato, 2010; Cherlin et al. 1991; McLanahan & Sandefur, 1994; Sigle-Rushton, Hobcraft, & Kiernan, 2005). The negative effect even extends into adulthood, as research shows worse (mental) health for adults whose parents got divorced, lower socioeconomic attainment, and higher chances of troubled relationships (Amato, 2010). However, not all children may be as negatively affected (Amato, 2010; Cherlin, 1999). With respect to one's own relationships, numerous studies consistently show that a divorce has negative consequences for health, income, and well-being when compared to people who remain married (Amato, 2010; Wade & Pevalin, 2004; Williams & Dunne-Bryant, 2006; Wu & Hart, 2002). Note that the negative effects of people's own divorce decrease over time and may be mitigated by remarriage (Amato, 2010; Johnson & Wu, 2002; Waite, Luo, & Lewin, 2009).

Disability

The onset of a physical disability or serious disease (such as cancer) has been found to be one of the life events with the strongest negative effects. People who experience such an event have to deal with the loss of bodily function, irrespective of physical pain, and this can lead to a sense of loss and to mourning. It further negatively affects job opportunities (and thus income) and can negatively impact one's relationships and social network. Becoming disabled has been found to lead to large decreases in well-being (Lucas, 2007; Turner & Noh, 1988) and loss of income (Jenkins & Rigg, 2004), and people may face social exclusion and isolation (Burchardt, 2003). People who acquire a disability/serious disease may not recover, and as such negative outcomes may endure. The counterclaim advanced in the "set point theory of happiness" that over time people always revert back to their "set point" of happiness regardless of major difficulties, such as

becoming and remaining disabled, appears to be largely unfounded (Lucas, 2007; Oswald & Powdthavee, 2008).

Job Loss and Unemployment

In the work career, the involuntary loss of a job is an important transition to study. Work connects people with society at large, gives a sense of purpose, lets people share in collective goals, provides a way to earn a living and to structure time, and is important for identity and status (Fryer, 1992; Fryer & Payne, 1986; Hanisch, 1999; Jahoda, 1982; Paul & Moser, 2009). Job loss often marks the start of ▶ unemployment and can have long-term repercussions for one's career ("scarring") (Arulampalam, Booth, & Taylor, 2000). The extensive literature that investigates links between labor market position and (mental) health finds that unemployment and job loss are associated with negative effects (Burgard, Brand, & House, 2007; Paul & Moser, 2009; Stevens, 1997). Reemployment, however, may nullify the negative effects of job loss and unemployment (Paul & Moser, 2009).

Future Research

Research into the effects of life events is moving from showing the presence of an effect to investigating heterogeneity. Research showing differences by gender and age has a long tradition (Paul & Moser, 2009; Simon, 2002; Williams & Dunne-Bryant, 2006). More recent findings point in the direction that people higher in socioeconomic standing experience fewer negative effects of divorce, disability, and job loss and unemployment (Clark, Georgellis, & Sanfey, 2001; Mandemakers & Monden, 2010; Mandemakers & Monden, 2013; Mandemakers, Monden, & Kalmijn, 2010). Quite some research shows heterogeneity by contextual factors related to regional and country differences [e.g., Gangl (2006), Kalmijn & Uunk (2007), and see ▶ Marriage, Cohabitation, and Well-Being in 30 Countries]. These studies contribute to the growing understanding that life events do not have uniform effects but are shaped by individual and contextual factors. Future research will hopefully paint an ever more complex and detailed picture and thereby enrich our understanding of life events.

Cross-References

- ▶ Disability
- ▶ Life Satisfaction
- ▶ Marital Status Influence on Satisfaction/ Happiness
- ▶ Marriage, Cohabitation, and Well-Being in 30 Countries
- ▶ Migration, an Overview
- ▶ Retirement Effects, Quality of Life
- ▶ Subjective Well-Being
- ▶ Unemployment

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Life Expectancy

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Synonyms

Expectation of life

Definition

Life expectancy is the expected number of years of life remaining at a given age determined statistically.

Description

Life expectancy is a summary measure of ▶ mortality in a population. Demography, which studies the characteristics of human populations is highly interested in this measure; see, for example, Yaukey & Anderton (2001). Statistics on life expectancy are derived from a mathematical model that converts a set of age-specific death rates into a survival curve. This model is known as a life table (Coale et al. 1983). In particular, life tables create a hypothetical cohort (or group) of 100,000 persons (usually of males and females separately) and subject it to the age-sex-specific mortality rates (the number of deaths per 1,000 or 10,000 or 100,000 persons of a given age and sex) observed in a given population. In that way researchers can demonstrate how this group of 100,000 persons would shrink in numbers due to deaths as they age. The average number of years a newborn baby can expect to live is the life expectancy. It is important to interpret data on life expectancy correctly. In countries with high infant ▶ mortality rates, life expectancy at birth is highly sensitive to the rate of death in the first few years of life. As a result, one could wrongly believe that populations with a low overall life expectancy will necessary have a small proportion of older people. Instead of using life expectancy at age zero, a more robust measure is life expectancy at age 5, which excludes the effect of infant mortality.

Life Expectancy, Table 1 Life expectancy at birth by world region, 2010

Area	Total	Males	Females
World	69	67	71
Developed countries	77	74	81
Less developed countries	67	66	69
Africa	55	54	57
Asia	70	68	72
Asia (excluding China)	68	66	69
Latin America (and Caribbean)	74	71	77
Europe	76	72	80
North America (USA and Canada)	78	76	81

Source: Population Reference Bureau. 2010 *World Population Data Sheet*. Washington, DC: Population Reference Bureau, 2010

It has been observed that there are great variations in life expectancy. There are ▶ sex differences, i.e., life expectancy worldwide is higher for females than for their male counterparts. Race differentials have been observed. Life expectancy at birth for whites significantly exceeded that for blacks at the turn of the twentieth century. Also, there are differentials in life expectancy across different parts of the world. Life expectancy in Africa is shorter than that in United States and Europe. This is attributed to ▶ public health, medical care, and socioeconomic differences. In particular, war, starvation, and diseases (such as AIDS and malaria) have considerably increased ▶ mortality in many African countries (Table 1). Socioeconomic status is related to mortality in US. Higher socioeconomic status measured by education, household income and occupational prestige is associated with lower mortality, see, for example, Kitagawa & Hauser (1973) and Kaplan (1973). Also, Cockerham (1997) points out that there is an upturn in deaths in Russia and selected Eastern

European countries (e.g., Estonia, Latvia, Lithuania). This is due to soviet health policy, social stress and poor health lifestyles. The latter is reflected in heavy alcohol consumption, smoking, lack of exercise and high-fat diets.

Life expectancy at birth, which measures a long and healthy life, is one of the three basic components of the ▶ Human Development Index (HDI) along with ▶ knowledge and standard of living. Schwartz (1998) argues that the dream of disease-free existence and an average life expectancy at birth 130 years can come true by exploding knowledge.

Discussion

Life expectancy is often wrongly considered as a synonym with life span. Life span refers to the number of years that human beings could live under ideal conditions. While life expectancy can be calculated in a precise manner using statistical methods, life span is speculative. This is the reason why the possible human life span is still questionable. Also, life expectancy can be confused with longevity. Unlike life expectancy, longevity is not associated with statistical techniques.

Cross-References

- ▶ Death Rate
- ▶ Human Development Index (HDI)
- ▶ Knowledge
- ▶ Mortality
- ▶ Public Health
- ▶ Sex Differences

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Life Expectancy and Subjective Well-Being

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Synonyms

Happiness and life expectancy; Health care; Life expectancy and well-being

Description

Introduction

In neoclassical economic theory, the claim of "objective" measures of well-being has been challenged, both theoretically and empirically, on grounds of sufficiency, accuracy, and methodology (Frey & Stutzer, 2002). The issue of sufficiency has been raised by social scientists who claim that the objectivists' view of human welfare and value is far too narrow in that they are exclusively concerned with the utility of outcomes, especially those derived from tangible goods, services, and leisure. The charge of inaccuracy is twofold. First, it is wrong to assume that choices are made under ideal market conditions, and secondly, it is wrong to assume that choices are always, or even often, an accurate reflection

of what gives satisfaction and utility. Finally, their methodology is based on the assumption that observed choices are the only aspect of human behavior that can be observed. Given these objections the "objectivist" approach to a scientific inquiry into the state and constitution of human welfare is at best an incomplete picture.

The "subjective" approach avoids these pitfalls. It takes as its data individual responses to the state of one's well-being and the ▶ values that constitute that well-being. This approach is certainly more direct and simpler; but it is not without its own problems. An individual's report of his subjective state still leaves us making inferences about her actual subjective state, only now from his own reports of it rather than from his choices. We are left wondering if his reports are reflections on the past or anticipations of the future. It very well could be unclear what emotional state is influencing his responses and so distorting them. For example, he may just be reflecting unjustified ▶ optimism about his future. Do such responses really reflect to a degree that would warrant confidence on our part an individual's real living conditions? Fortunately, however, from the perspective of public policy concerned with improving human ▶ welfare, we do not need overwhelming confidence that his responses provide an accurate picture of his ▶ subjective well-being. In the first place, there is a large part of the SWB of individuals that is the responsibility of the individual. Public policy should not hinder the reasonable realization of most aspects of SWB, but neither should it promote them. On the other hand, if there is some universal aspect of SWB that public policy can promote without hindering the realization of other subjectively valued factors, then we ought to do what we can to discover what will promote it.

In the paper "Life Expectancy as an Objective Factor of a Subjective Well-Being" (Papavlassopulos & Keppler, 2011), it is shown that one such factor is duration of life. This is not something new (Veenhoven, World database of Happiness). The approach and target are different, while the ▶ need to incorporate ▶ life expectancy as part of well-being has been encouraged and supported by the works of many others (Layard, 2005). In the medical field, indicators like QALY and HYE duration of life are central. The difference in this new approach is that it does not target ▶ health, but rather well-being. This difference is critical. For example, a terminally ill person with 6 months to live may have a very low QALY, but can still experience a high level of well-being.

A Definition and Mathematical Formulation of Well-Being

The new approach assumes that the quality of an entire life can be measured, even if it is impossible to fill in many of the details that constitute it. Details aside, two basic ingredients of the well-being of an entire life are its duration and the level of ▶ happiness or ▶ satisfaction generated in the course of that life (SWB). Every life, except short ones, is filled with good times and bad, is molded by privilege and/or adversity, experiences good and bad luck, ▶ pleasure and ▶ pain, happiness and sorrow, fear and bravery, despair and hope. Every life varies with respect to quality over time. Now if we had a way of measuring (as done in surveys) the different levels of quality, then "well-being" could be represented as the product of an average level of the quality of life and the duration of life. That is, if we express well-being by Q, life duration by T and the average level of quality of life (or constant equivalent) by q*, we can get the following mathematical relation:

$$Q = q* \times T$$

The above formulation of "well-being" (Q) as the product of the pair q* and T supports our intuitions and, given certain realistic assumptions, offers substantial analytical flexibility in understanding and explaining (even to an abstract degree) several aspects of human behavior that seem puzzling. As long as life has a positive quality ($q* > 0$), an increase in the duration of life, T, will increase well-being (Q). Since T is an objective factor, then public policies that do not significantly interfere with q* can target T to enhance well-being, for example, requiring food

labels on packaged food and drinks, stop signs on roads, seat belts, and regulations and requirements for safe working conditions.

Moreover, given the above definition and assuming that people are forward looking and that their interactions with nature and society are driven by the desire to improve and defend expected well-being, then it follows that humans do not value duration of life (T) per se. That is, for humans, there are worse things in life than ▶ death, specifically, a negative q*. The instinct for survival can be overcome by the right set of circumstances. Euthanasia, suicide, and willful sacrifice can all be explained as actions that seek to improve expected well-being. Furthermore, it can be shown that the above formulation of well-being is useful in analyzing why differences among people in q* and T can lead to different decisions. That is, differences in ▶ quality of life or differences of age, for example, can result in significantly different decisions. Finally, but very importantly, it can be shown that when forward-looking people make decisions to improve or defend their expected Q, they rely critically on the information set possessed at the moment of the decision, making the quality of the information set critical to the improvement of future Q. With higher quality information, people will be better able, on average, to improve Q. Hence, education is another important objective factor in the improvement of well-being. The cultivation of intelligence through ▶ education, what economists call "▶ human capital," does not make people only more productive – something supported by data – but also better decision makers. Whether education per se makes people happier and provides them with a higher Q, by enhancing interests, expanding the range of values to be pursued, and etc., is something worth investigating.

On Income vs. Happiness and Life Duration

The usefulness of representing well-being, Q, as the product of life quality, q*, and life duration, T, is demonstrated by the ease with which we can bypass the apparent conflicts between income and happiness while still maintaining that income improves well-being. SWB research was triggered in the 1970s when standard economic theory and common intuition were challenged by the Easterlin findings (Easterlin, 1974). However, the weak link between economic growth and happiness, which is supported even by recent SWB studies (Stevenson & Wolfers, 2008), was established much earlier by well-known economists. The primary culprit appeared to be market inefficiencies. There were concerns that the costs of economic growth were not properly captured by the markets, thus triggering a search for those costs (Mishan, 1967). Nordhaus and Tobin tried to measure the costs by developing the MEW index (measure of economic welfare) (Nordhaus & Tobin, 1972). Their studies revealed that while the post World War II GNP per capita in the USA had risen significantly, the MEW index had risen by much less (Baumol & Binder, 2003). Thus, it became clear that the correlation between income growth and improvement in real material conditions (which quality of life rests upon) is much weaker and more complicated than previously thought.

In SWB research the explanation of the "weak link" has relied more on psychological factors than objective economic ones, and while they are certainly worth examining, sole reliance on psychological factors may well undermine any argument for public policy. The fact that income per capita in the USA is way up from 30 years ago with no increase in reported happiness can perhaps be explained by Layard's "relative income" hypothesis (Layard, Maynaz, & Nickell, 2009) or Easterlin's "aspiration" hypothesis (Easterlin, 2001), but so can an economic analysis which does not assume efficient markets and ideal conditions. In other words, even though mental states are not a perfect reflection of economic conditions, it could still be the case that economic conditions bear heavily on mental states. And if they do bear heavily on them, then imperfect economic conditions can still play a causal role in the disconnect between income and reported happiness, even if that role is less than fully sufficient. How likely is it that the average income in the USA has reached a height whereby doubling it – with no additional cost

required to generate the extra income – no longer causes a corresponding increase in average happiness? It seems highly unlikely that such a satiation point has been reached. Thus, it is quite reasonable to look at economic conditions as part of any complete explanation.

Although there may be little consensus concerning the explanation for the lack of correlation between income and happiness, the same is not true when we deal with the impact of income on life duration, T, and thus well-being, Q. Of course, a host of factors can affect life expectancy, as is true of the levels of our happiness. However, unlike happiness, economic growth and life expectancy appear to correlate almost universally. (See results below.) This is confirmed in "Life Expectancy as an Objective Factor of a Subjective Well-Being." Data were collected from the World Health Organization and simple regressions were run. These confirm that a log linear relation between life expectancy and income is a better fit than a simple linear one and that the positive impact of income on life duration is strong. Similar findings have been established by other studies in the field. This establishes the fact that income is an indisputable factor with positive and strong influence on life expectancy and thus, according to our formulation, on well-being, Q.

That is, by assuming $\ln T = \alpha + b \ln Y + \varepsilon$, where T is life expectancy, Y income per capita, a and b constant parameters, and ε an error term, we get the following:

R^2	α	Parameter ***b***	T-statistic for ***b***
0.635113	3.2504	0.108661	16.2108

This field of study has its own controversies. For example, per capita income is much higher in the USA than in Greece, yet life expectancy is pretty much the same. More broadly, life expectancy rankings from country to country do not exactly correspond to income per capita ranking indicating that there are other causal factors at work here. From a public policy perspective, the log linear positive relation between income Y and life expectancy, T, implies that average life expectancy can be improved with income redistribution or policies of less income inequality. A similar impact on life expectancy is access to ▶ health care, shown also by running a simple regression on a log linear relation between the two. That is, by assuming $\ln T = \alpha + b \ln H + \varepsilon$ where T is life expectancy, H health care per capita, a and b constant parameters, and ε an error term, we get the following:

R^2	α	Parameter ***b***	T-statistic for ***b***
0.617737	3.651771	0.093223	15.62

Comparing the parameters $b = 0.108661$ of income per capita Y and the parameter $b = 0.093223$ of health care per capita H, we see that a 10 % increase in income increases life expectancy on average by 1.08 years, while a 10 % increase in health care increases life expectancy by 0.93 years. These are preliminary and initial statistical results, and further statistical analysis may be required. However, given the strong correlations between access to health care and life expectancy, a good case can be made for targeting healthcare by public policy, especially in the USA.

Finally a theoretical explanation is provided on how different health-care systems can have a significant impact on individual and population life expectancy and why the US health-care system may be another contributing factor (other than income inequality) of the low life expectancy in the USA when compared with that of other advanced industrialized countries. Lower health-care costs are important to life expectancy, but more than, that the theoretical analysis shows how a market-oriented health-care system can make a naturally indiscriminate disease become discriminate. That is, market-oriented health-care systems discriminate against lower incomes, transferring most of the net benefits of health care to higher ones. Hence, any rising income inequality would be accompanied by a rising inequality in life expectancy. This is in fact occurring in the USA as reported in the New York Times in March of 2008. On March 23rd of that year Robert Pear wrote:

> ....government research has found "large and growing" disparities in life expectancy for richer and poorer Americans paralleling the growth of income inequality in the last 2 decades . Life expectancy for the nation as a whole has increased, the researchers said, but affluent people have experienced greater gains, and this, in turn, has caused a widening gap. The gaps have been increasing despite efforts by the federal government to reduce them. One of the top goals of "Healthy People 2010," an official statement of national health objectives issued in 2000, is to "eliminate health disparities among different segments of the population," including higher- and lower-income groups and people of different racial and ethnic background.

In conclusion, if what constitutes happiness, q*, is in dispute, the same cannot be said with regard to life duration, T, and its impact on well-being, Q. Hence, any serious attempt by focused public policy to improve Q could start by targeting T and to a degree this is being done. However, not enough is being done to reverse or even slow the growing inequities of life expectancy across income levels in the USA. Some measures that can be taken to stem the growing divide, as shown in the theoretical analysis, are a more progressive tax rate system and conversion to a single payer nonprofit management system for all of health care.

Lastly, to the objection that such changes may negatively affect the happiness of others in ways that are immeasurable, thus making it impossible to compare the impact on well-being in general within a given population, Amartya Sen has the following to say:

> "It can also be shown that there may be no general need for terribly refined interpersonal comparisons for arriving at definite social decisions. Quite often, rather limited levels of partial comparability will be adequate for making social decisions." (Sen, 1999)

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Life Expectancy and Well-Being

▶ Life Expectancy and Subjective Well-Being

Life Facet Satisfaction

▶ Domain Satisfaction

Life Force in Africa

▶ Vitality, Community, and Human Dignity in Africa

Life Goals

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Synonyms

Life priorities

Definition

Life goals are aims to which an individual may give higher or lower priority.

Description

Life goals are usually measured in surveys by asking respondents to rate or rank how "important" various aims in life are to them (e.g., a good marriage and family life; a high material standard of living; helping others in the community). A typical response scale runs between 0 and 10, or 1 and 4, with the top end of the scale marked "very important" and the bottom end marked "not at all important."

Importance ratings have been regarded as problematic in research on subjective well-being (SWB). Clearly, from both a "pure" research point of view, and for public policy purposes, it is crucial to ascertain which domains and subdomains of life matter most to people. The obvious way to find out is to ask. However, the Michigan pioneers of quality of life research, notably Andrews and Withey (1976), found that data on life goals, elicited by importance ratings, had low reliability, particularly low test-retest reliability. They also found that weighting satisfaction with particular life domains by the importance attached to those domains *reduced* rather than increased the variance accounted for in overall life satisfaction (Andrews & Withey, 1976; Campbell, Converse, & Rodgers, 1976). One problem appeared to be that many respondents tended to rate almost all goals as "very important," and particularly tended to give very high ratings to rather bland, socially desirable aims, like having a good marriage, and good health (see, for example, Rokeach, 1973). It appeared that *social desirability bias* might seriously contaminate data on life goals. Another, more general conclusion drawn by the Michigan researchers was that it might be a mistake to ask about life goals or "values" in social surveys, because ordinary people are not philosophers and may give little thought to their priorities in life (Andrews & Withey, 1976).

Instead of asking directly about life goals, the main approach taken in most quality of life research is to *infer* which domains matter most to people by observing which domain satisfactions covary most strongly with life satisfaction. Clearly, if this method is used, inferences cannot be made about the life priorities of specific individuals, but researchers can attempt to infer the priorities of populations or subgroups.

In recent years, research on subjective well-being (SWB) in which questions are asked directly about goals and "values" has made a comeback. This is partly due to the influence of positive psychology. Positive psychologists do not accept definitions of happiness based solely on satisfaction scores, or some other kind of hedonic rating. Instead they believe (and it appears to be at least partly a normative position) that a sustainably happy life must be characterized by *meaning* and *engagement*, as well as satisfaction (Seligman, Parks, & Steen, 2005). Undertaking research on meaning and engagement almost unavoidably requires asking individuals about their goals and intentions. There is now a great deal of published research by positive psychologists which reports positive associations between altruistic or pro-social goals and behavior (e.g. volunteering) and higher levels of SWB (Lyubomirsky, Sheldon, & Schkade, 2005; Seligman et al., 2005; Thoits & Hewitt, 2001). It may, however, be fair comment that most of the research has not yet demonstrated long-term benefits.

Outside of positive psychology, there have also been renewed attempts to measure life goals and relate them to SWB. The managers of the German Socio-Economic Panel appear to have taken a particularly valuable approach to goal measurement. They reasoned that the weakness of linkages between life goals and SWB found in previous research might be due to the fact that survey respondents had been presented with miscellaneous lists of possible goals, lists based on little prior understanding of what might matter most. Trying to overcome this problem, the German research group performed factor analyses on a range of possible goals/priorities/values and found that three factors accounted for most of the variance: material and career priorities/values, family priorities/values, and somewhat altruistic values concerned with social and community life (Gerlitz & Schupp, 2005; Kluckhohn & Strodbeck, 1961).

Subsequent research has found some evidence that individuals who prioritize material and career goals have lower levels of SWB than those who prioritize family goals, or pro-social altruistic goals (Diener & Seligman, 2004; Headey, Muffels, & Wagner, 2010; see also Dunn, Aknin, & Norton, 2008). Headey (2008) speculates that these findings could be interpreted as suggesting that prioritizing nonzero sum goals is a better recipe for happiness than prioritizing zero sum goals (one person's gain is another's loss). These findings and interpretations remain controversial, in part because it is possible that happy people prioritize pro-social goals because they feel happy, rather than the priorities themselves having a beneficial effect on happiness. Be this as it may, growing attention to these issues is evidence of renewed effort in quality of life research and positive psychology to find links between SWB and conscious life goals, priorities, and intentions.

Cross-References

- ▶ Factor Analysis
- ▶ Positive Psychology
- ▶ Quality of Life Research
- ▶ Social Desirability Bias

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Life Goals and Well-Being in Hungary

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Synonyms

Hungarostudy Epidemiological Panel (HEP)

Definition

Life goals are higher level agents in self-regulation representing "broad, far-reaching agendas for important life domains" (Roberts & Robins, 2000, p. 1284). Hungary is a European Union member country in Central Europe with a total area of 93,030 km^2, population 9,958,453, and nominal GDP per capita $14,050 (2011 estimates).

Description

Inspired by the work of Kasser and colleagues (Kasser & Ryan, 1996), extensive research has examined the association between value orientation of life goals (i.e., aspirations) and well-being. Relative importance of intrinsic (e.g., personal growth, loving relationships, community contribution) and extrinsic life goals (e.g., wealth, fame, good appearance) have consistently been found to be connected to higher levels of well-being and better mental health (Kasser & Ryan, 1996; Kasser & Ahuvia, 2002). Though primarily conceptualized as a North-American concern, the association between life goals and well-being has been studied in several other countries as well (Kim, Kasser, & Lee, 2003; Rijavec, Brdar, & Miljkovic, 2006; Ryan, Chirkov, Little, Sheldon, Timoshima, & Deci, 1999; Schmuck & Kasser, 2000). Results consistently pointed to the cross-cultural generalizability of the original findings.

In line with these results, the first data with nonrepresentative Hungarian adult samples showed that importance of intrinsic life goals is in positive association with indices of well-being like life satisfaction, meaning in life, and low depressive symptomatology (Martos, Szabó, & Rózsa, 2006; V. Komlósi, Rózsa, Bérdi, Móricz, & Horváth, 2006). In contrast, importance of extrinsic life goals showed mostly nonsignificant relationship to these characteristics.

In the present entry, we present findings on these associations between life goals' value orientations and well-being from a representative Hungarian adult sample using the database of the Hungarostudy Epidemiological Panel (HEP) 2006. We focus on a couple of important points that have been seldom addressed previously.

- Previous studies relied mostly on relatively small samples of students and young adults, we have used data from a large-scale representative Hungarian survey.
- There are several factors that may confound or moderate the proposed relationship between goal orientation and well-being (e.g., gender, age, education, religiosity, self-rated health, and financial status). However, these were rarely controlled for in the previous analyses.
- As a specific factor, we examined the financial status of the individual as a common ground and as a moderator in the relationship between life goal importance and well-being. First, the financial status of the individual may represent a possible common ground both for value orientation of aspirations (see Kasser, Ryan, Zax, & Sameroff, 1995) and well-being (Diener & Biswas-Diener, 2002). Second, financial status may function as a moderator in the association between values and well-being (c.f., Downie, Koestner, & Chua, 2007; Nickerson, Schwarz, Diener, & Kahneman, 2003). Specifically, low income/poor subjective financial status may attenuate the presumably negative link between extrinsic aspirations and well-being.

Method

Sample and Procedure

Our analysis was based on data from the Hungarian Epidemiological Panel (HEP). HEP is a prospective nationally representative survey focused on the quality of life and the biopsychosocial causes of diseases in the Hungarian adult population. The first wave of the data collection was conducted in 2002. Among the 12,640 persons in the 2002 survey, 4,528 persons who agreed to participate in the follow-up were interviewed again in 2005 and 2006. Additional subjects were enrolled in the 2005/2006 survey in order to balance out the slightly biased response rate. After further correction for minor deviation from the representativity by weighing, the

2005/2006 sample may be regarded as a representative sample for the adult Hungarian population by age, gender, and region of settlement. We will use here only this second set as a cross-sectional database, since life goal measure was included only in this assessment.

HEP contains self-report data from 4,841 Hungarian-speaking adult residents, 1993 (41.2%) males and 2,848 (58.8%) females. The age of the respondents ranged from 22 to 100 years (m = 48.33, SD = 17.50). Educational attainment was classified into three categories: lower than high school ("low," N = 2,676, 55.2%), high school ("medium," N = 1,479, 30.6%), and college/university or higher ("high," N = 686, 14.2%) with one case missing.

Measures

Background Variables

Personal net income per month was assessed in HUF (1000 HUF is approximately 3.5 Euro/5 USD). Subjective financial status (SFS) was measured by the item "Compared to others in Hungary, how would you rate your financial situation?" (0 = much worse, 10 = much better).

The importance of religion was assessed by the item: "How important is religion in your daily life?" ("not at all important," "somewhat important," "very important," and "influences all my acts"). Since the fourth category was chosen only by a minority of the sample (4.3%), it was included into the third category.

To estimate the participants' self-rated health (SRH), a single-item question was used: "On the whole, how would you rate your health status (1 = very bad, 2 = bad, 3 = average, 4 = good, 5 = excellent)?" Since extreme answers were infrequent ("very bad" 4.8 % and "excellent" 7.5% of the total sample), we recoded the SRH variable into three categories incorporating the extremes into the closest categories.

Shortened Aspiration Index

The importance of life goals was measured by the shortened version (Martos et al., 2006) of the Aspiration Index (Kasser & Ryan, 1996) consisting of 14 items representing seven types of goals by 2 items each. Intrinsic aspirations are self-acceptance, e.g., "To know and accept who I really am"; good relationships, e.g., "To have deep enduring relationships"; and community contribution, e.g., "To work to make the world a better place." Extrinsic aspirations are wealth, e.g., "To be rich"; fame, e.g., "To be famous"; and physical appearance, e.g., "To achieve the 'look' I've been after" (1 = not important at all, 5 = very important; alpha = .81 and .83 for intrinsic and extrinsic subscales). Two further items referring to the importance of health goals were not analyzed here.

Self-Rated Quality of Life

Two single-item questions were used to estimate the participants' subjective evaluation of their quality of life: "On the whole, how satisfied are you with your life (1 = completely unsatisfied, 10 = completely satisfied)?" and "On the whole, how happy are you (1 = completely unhappy, 10 = completely happy)?"

WHO Well-Being Index

The 5-item Hungarian version of the WHO (Ten) Well-Being Index (Bech, Staehr-Johansen, & Gudex, 1996) was used to assess occurrence of positive mood states (e.g., cheerful and happy) in the past 2 weeks (0 = not at all true, 3 = completely true, alpha = .86).

Meaning in Life

Sense of meaningfulness in life and coherence was assessed by eight items of the Meaning in Life Scale of the Brief Stress and Coping Inventory (BSCI-ML, Konkoly Thege, Martos, Skrabski, & Kopp, 2008) ("My values and beliefs guide me daily," 0 = not true, 1 = sometimes true, 2 = always true, alpha = .74).

Results

Based on a preliminary PCA, z-scores of the WHO Index and ratings of satisfaction and happiness were combined into a composite SWB score, while BSCI-ML score was used separately.

Life Goals and Well-Being in Hungary, Table 1 Hierarchical linear regression analysis for SWB and ML

	SWB			ML		
	B	SE	Beta	B	SE	Beta
Step 1						
Gender (0 = male)	−.223	.069	−.042**	.075	.098	.011
Age (years)	.004	.002	.026	.020	.003	.103***
Education (low = 0, medium = 1)	−.075	.078	−.013	−.085	.111	−.011
Education (low = 0, high = 1)	−.049	.109	−.007	.155	.156	.016
Income	−.003	.182	.000	.097	.260	.006
SFS	.315	.019	.229***	.188	.027	.103***
Religiosity (no = 0, moderate = 1)	.020	.076	.004	.282	.108	.040**
Religiosity (no = 0, high = 1)	.010	.089	.002	.703	.127	.090***
SRH (bad = 0, average = 1)	1.689	.096	.319***	1.018	.137	.145***
SRH (bad = 0, good = 1)	3.064	.106	.589***	1.916	.151	.278***
R^2 change	.340			.125		
F (change)	213.6	p < .001		59.3	p < .001	
Step 2						
Extrinsic	**.182**	**.054**	**.057****	**−.590**	**.077**	**−.140*****
Intrinsic	**.532**	**.061**	**.151*****	**2.288**	**.087**	**.489*****
R^2 change	.027			.138		
F (change)	89.9	p < .001		388.9	p < .001	
Full model R^2	.367			.263		
Full model F	20.6	p < .001		123.4	p < .001	

Note: SFS subjective financial status, SRH self-rated health, Extrinsic importance of extrinsic aspirations, Intrinsic = importance of intrinsic aspirations, SWB = subjective well-being composite, ML = meaning in life
*p <. 05
**p < .01
***p < .001

Two series of hierarchical multiple regressions were run for the two well-being measures. In the first step, outcome variables were regressed on the control variables (gender, age, education, religiosity, SRH, income, and SFS). Extrinsic and intrinsic aspirations were entered in the second step. Finally, multiple interaction terms were added in the third step in two separate analyses (Income x Extrinsic and Income x Intrinsic, as well as SFS x Extrinsic and SFS x Intrinsic) by each outcome to check the interaction of aspirations with income and subjective financial status in predicting SWB and ML. Results are presented in Table 1.

For SWB, Step 1 explained 34.0% of variance and Step 2 (extrinsic and intrinsic aspirations) another 2.7% of variance, both steps are significant (p < .001). Addition of multiple interaction terms resulted in a nonsignificant increase in explained variance. For income, Step 3 resulted in.1% of additional explained variance (F (2, 4136) = 3.66, p = .026) for income and only in.09% of additional explained variance (F (2, 4141) = 2.59, p = .076) for SFS. These results were considered trivial; therefore, Step 3 was disregarded when presenting the main results. Among the control variables, gender (beta = − .042, p < .01), SFS (beta = .229, p < .001), and SRH (beta = .319 and .589 for the two dummy variables, both ps <.001) emerged as significant predictors for SWB. Moreover, extrinsic and intrinsic aspiration were both independent predictors (betas = .057, p < .01 and .151, p < .001, respectively).

For ML, Step 1 explained 12.5%, and Step 2 explained an additional 13.8% of the total variance (both ps < .001). Again, multiple interaction terms in Step 3 did not result in a significant

increase in the explaining power of the model. Interaction terms with income explained.09% of variance (F (2, 4137) = 2.94, p = .053), and interaction terms with SFS explained.05% of variance (F (2, 4141) = 1.50, p = .223). As nonsignificant and trivial results, they were omitted from the presentation in Table 1. Age, SFS, religiosity, and SRH were significant predictors for ML among the control variables. Furthermore, both extrinsic and intrinsic aspirations predicted ML significantly, extrinsic aspirations negatively, and intrinsic aspirations positively (betas = −.140 and .489, respectively, both ps < .001). It is important to note, that, unlike in the bivariate analysis, the association between extrinsic aspirations and ML proved to be negative, when controlled for the other variables.

Conclusion

In a national representative study in Hungary, the importance of life aspirations was found to be related to sociodemographic characteristics, financial status, and well-being. In summary, our results indicate that intrinsic and extrinsic life goals are unique predictors of subjective well-being and meaning in life, even after controlling for a series of background variables including objective and subjective financial status.

First, both kinds of life goals were in positive association with SWB, the importance of intrinsic aspirations being the stronger predictor. In case of ML, however, importance of extrinsic aspirations proved to be a negative predictor, while importance of intrinsic aspirations was one of the most positive predictors. One possible interpretation of these results is that while the orientation toward extrinsic goals may contribute to the present mood and satisfaction, they may bring along personal costs in the long run. In contrast, the pursuit of intrinsic life goals may indiscriminately support well-being.

Second, we did not find support for the assumption that financial status would moderate the relationship between life goals and well-being. This may be interpreted in a way such that the above mentioned relationships apply indiscriminately for poorer and richer respondents in our sample.

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Life Meaning

► Meaning in Life

Life Priorities

► Life Goals

Life Quality Index

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Synonyms

LQI

Definition

The Life Quality Index (LQI) is a compound social indicator, a time series of the form $L = CG^{0.2}E$, where G is the gross domestic product (GDP) per capita and E is the life expectancy at birth. C is an arbitrary constant in the sense that it may be chosen to suit the application. In some applications, the LQI has been written in the equivalent 5th-power form: $cGE^{5.0}$ $(=L^5)$. The value of the arbitrary constants does not influence results in applications. In some applications, to public health, for example, E is adjusted for state of health.

Description

The LQI was derived using the concepts of economics, welfare economics, and a lifetime utility function and calibrated using econometric data for OECD member countries for the period 1970–2003 (Pandey, Nathwani, & Lind, 2006). Like the Human Development Index, the Calibrated Development Index, the Legatum Prosperity Index, etc., the LQI can be used to rank countries. However, more importantly the Life Quality Index is used as a tool in the management of life risks, health risks, and safety policy to support decisions about programs and practices. The LQI allows a transparent and consistent basis for assessing the net benefit arising from projects, programs, standards, and policies expected at some cost to improve health and safety or enhance the quality of life.

Discussion

The Life Quality Index is a Life Product Indicator, LPI (Lind, Nathwani, & Siddall, 1992). The LPI reflects a marginal monetary value of time; the LQI is a rigorous calibration using the marginal value of time as revealed by preferences of people in developed countries. The LPIs were developed simultaneously with the Human Development Index, independently but out of a similar concern that GDP is not a complete measure of a country's achievements in serving the interests of its citizens.

Ernest Siddall (coauthor of Lind et al. (1992)) commented that a person generally desires a long life together with the means for the consumption desired. Based on this observation, the LPI format was developed. Life expectancy is a time-extensive variable, while GDP is time-intensive. Social indicators that compound the two, which includes the LQI, other LPIs, and the HDI, should therefore properly take the form of a product.

Applications

By its composition, any compound social indicator defines the marginal rates of substitution of its components. The LQI thus implies an equivalence between a change in life expectancy [in good health] and a change in GDP per capita. Lind (2002, 2005) proposed a time principle, stating that a prospect to save life or produce wealth is optimal if no alternative presents a greater life expectancy net of work-time cost. Together with this time principle, the LQI serves to define what a reduction in risk to life and health is worth in money, what would be an appropriate compensation for occupational risk, etc. There are numerous examples in the literature (Maes, Pandey, & Nathwani, 2003; Nathwani, Lind, & Pandey, 1997; Nathwani, Pandey, & Lind, 2009; Pandey & Nathwani, 2003a, 2003b, 2003c; Rackwitz, 2002, 2003).

Reliability

As a compound of life expectancy, GDP, and population, the Life Quality Index is among the most reliable social indicators – about as reliable as population, which is its most uncertain component.

Validity

The Life Quality Index cannot be said to be a valid indicator of what is commonly understood as "life quality." Life quality is a more comprehensive concept that includes good government and gender equality. It is better thought of as an indicator of gross human well-being, more precisely the aspect of well-being that reflects the length life and does not explicitly consider the value of education.

Cross-References

- ▶ Human Development Index
- ▶ Legatum Prosperity Index
- ▶ Welfare Economics

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Life Satisfaction

- ▶ Down Syndrome
- ▶ Happiness
- ▶ Quality-of-Life-Inventory
- ▶ Satisfaction with Life as a Whole
- ▶ Subjective Health and Subjective Well-Being
- ▶ Subjective Well-Being (SWB)

Life Satisfaction and Housing

▶ Housing and Quality of Life

Life Satisfaction and Subjective Happiness

▶ Subjective Happiness Scale

Life Satisfaction and Sustainable Consumption

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Synonyms

Environmentally friendly purchases; Environmental protection and sustainability; Green purchases; Intentional activity; Prosocial behavior; Resource utilization

Definition

The often cited definition of sustainable consumption, proposed at the Oslo Symposium in 1994 (Oslo Roundtable, 1994), is "the use of goods and services that respond to ▶ basic needs and bring a better ▶ quality of life, while minimizing the use of natural resources, toxic materials and emissions of waste and pollutants over the life cycle, so as not to jeopardize the needs of future generations." This definition is broad and rich with multiple meanings for multiple sectors of society. First, it refers to activities by both production units and individual consumers. Second, it concerns environmental protection and resource utilization equally. Third, it seeks a balance between ▶ well-being of current and future consumer populations. Many definitions about sustainable consumption similar to the Oslo definition are proposed that fall into two major categories, reducing unsustainable consumption and changing lifestyles that include eliminating consumption of certain products (Jackson, 2006). Sustainable consumption can be referred to both industrial and individual consumption activities. To motivate individual consumers to engage in sustainable consumption practices, a definition relevant to individual consumers is needed. To help promote sustainable consumer behavior, a more specific and straightforward definition should contribute to easy measurement, observation, and communication. If the term *consumer* denotes person who uses market goods and services, then *sustainable consumer behavior* denotes any consumer practice that directly or indirectly contributes to - consumer welfare and environmental protection.

The definition of subjective well-being (SWB) covers a broad, multifaceted domain, which includes both affective and cognitive components (Diener, 1984; Sirgy et al., 2006). According to Diener, Suh, Lucas, and Smith (1999), "... subjective well-being is a broad category of phenomena that includes people's emotional responses, ▶ domain satisfaction, and global judgments of life satisfaction" (p. 277). Life satisfaction is an important component of ▶ subjective well-being (Diener, 1984).

Description

In the last three decades, research on subjective well-being has exploded. Researchers studied the causes and outcomes of SWB from diverse perspectives (Sirgy et al., 2006). Relevant to sustainable consumption are two lines of research on SWB, the relationship between SWB and money and the role of behavior on SWB.

The relationship between subjective well-being and money is complicated and depends on contexts and circumstances of the situation. According to a comprehensive review (Diener & Biswas-Diener, 2002), income was

positively associated with SWB within nations and between nations. Within nations, positive associations between income and SWB were more obvious among low- and middle-income populations. However, economic growth measured by per capita GDP was not associated with SWB, and pursuing a materialistic goal was detrimental to SWB. In addition to income, nondurable consumption was found to be an important factor associated with SWB (Heady, Muffels, & Wooden, 2008). Results from Peru revealed that consumption had a meaning beyond mere basic needs satisfaction. Other factors included status concerns, the reference group, and the ▶ pleasure of consuming significantly predicting people's happiness (Guillen-Royo, 2008).

Another line of research on SWB attempts to identify broad categories of factors associated with SWB. Lynbomirsky, Sheldon, and Schkade (2005) reviewed the literature of ▶ happiness research and summarized three broad factors that influence happiness: (a) set points (50 %), (b) circumstances (10 %), and (c) intentional activity (40 %). They stressed the importance of intentional activity and argued that to develop effective interventions to improve the happiness level, intentional activity or behavior is an important factor to consider. Their own research provided evidence for this argument. Other research on behavior and happiness supports this view. For example, a study of college students showed that positive financial behaviors contributed to financial satisfaction and life satisfaction (Xiao, Tang, & Shim, 2009).

Another study examined the relationship between prosocial spending behavior and life satisfaction and found that spending on others contributed to life satisfaction (Dunn, Aknin, & Norton, 2008). The researchers developed their research based on findings of the above two lines of research and also on a common finding in the SWB literature in which social relationships were positively associated with SWB. If it is true that prosocial spending behavior generates more life satisfaction, it should be shown in other prosocial behaviors. One of such prosocial behaviors is relevant to sustainable consumption. Sustainable consumption is closely related to environmental protection. International comparative research indicates that citizens in wealthier nations express greater concern for the global condition of the environment than those in poorer countries (Franzen, 2003). Environmental attitudes may also be associated with individual income and education, according to a study conducted in South Africa (Struwig, 2010).

One aspect of sustainable consumption is environment-friendly purchase or green purchases. Research suggests environment-friendly behavior may be associated with subjective well-being. A study of ecological sustainability found that ecologically *sustainable* behavior independently explained statistically significant amounts of variance in subjective well-being (Jacob, Jovic, & Brinkerhoff, 2009). Another research study based on two samples (an adolescent and an adult one) reported results that individuals higher in subjective well-being reported more ecologically responsible behavior (Brown & Kasser, 2005). Using data from Chinese consumers, Xiao and Li (2011) found that green purchase intentions and behavior are associated with a higher level of life satisfaction.

Discussion

Sustainable consumers contribute to the well-being of both individual consumers and society as a whole. Research on this topic would help policy makers and educators better understand human behavior when they make comprehensive social, economic, and environmental indicators to measure positive social changes (Michalos, 1997). The research on sustainable consumption and life satisfaction has just started, and many topics can be further researched more broadly and deeply. National and international surveys could be conducted to document the scope and trends of sustainable consumer behavior. Mechanisms of the positive associations between sustainable consumption and life satisfaction could be explored with well-designed experimental research. The definition of sustainable consumption should include

the social justice dimension that encourages consumers to increase certain consumption activities and decrease others to reduce social injustice and disparities worldwide.

Besides more research on this important topic, specific measures should be proposed to encourage consumer sustainable behaviors. All sustainable consumer behaviors will help promote consumer welfare and protect the environment directly and indirectly. These activities help promote consumer health, save resources such as energy and water, avoid polluting resources such as water and air, and avoid producing environment hazards such as noise and trash. In the literature of environmental protection, an effective communication approach is to use several Rs to promote desirable behaviors, such as react, recycle, reduce, reevaluate, reform, refuse, rescue, respect, rethink, and reuse. Following this approach and based on the definition of sustainable consumer behavior, for the purpose of demonstration, six Rs are specified for encouraging sustainable consumer behaviors – reach, refuse, reduce, reuse, recycle, and respond – which are as follows:

1. Reach: reach and buy green products whenever possible. Green products are those that are made by green production with government certification and those that can be reusable and recycled.
2. Refuse: do not buy and use products that will harm consumer health, the environment, or both. Do not do things that will harm consumers and environment.
3. Reduce: reduce the quantity of products purchased and used whenever possible.
4. Reuse: reuse products in their original function or reformed functions whenever possible. Re-gift whenever is possible.
5. Recycle: recycle anything if possible. Actively participate in any recycling programs available in communities.
6. Respond: respond to the alarming signs of environmental deterioration and actively participate in public policy-making processes and community activities to promote consumer welfare and environmental protection (Xiao & Ying, 2008).

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Life Satisfaction and Youth Developmental Assets

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Definition

Youth developmental assets [YDAs] were conceived to reflect core human developmental processes. Accordingly, YDAs include the kinds of relationships, social experiences, social environments, patterns of interaction, norms, and competencies over which a community of people has considerable control. That is, YDAs are more about primary processes of socialization than the equally important community areas of economy, services, and the "bricks and mortar" of a city (Benson, Leffert, Scales, & Blyth, 1998). These YDAs are grouped into either internal or external assets. Internal YDAs are skills, values, and commitments that stem from within an individual including (but not limited to) humility, appropriate decision-making, and a sense for his or her own ▶ purpose in life. Internal YDA categories include commitment to learning, positive values, social competencies, or positive identity. In contrast, external assets develop outside of an individual. External assets are positive experiences and interactions gained from one's family, non-parental role models, school, community, and service groups. External asset categories include support, empowerment, boundaries and expectations, or constructive use of time (Sesma & Roehlkepartain, 2003).

Description

Adolescent Developmental Period

The adolescent period is one of rapid and transformative physical, psychological, sociocultural, cognitive and affective development, characterized by efforts to confront and surmount challenges and to establish a sense of identity and autonomy. While the majority of adolescents manage the sometimes turbulent transition from childhood to adulthood to become healthy and productive adults, there is an emerging concern that far too many adolescents may not achieve their full potential as employees, parents, and productive citizens. In turn, adolescence is also a period fraught with many threats to the health and well-being of adolescents, many of whom suffer substantial premature impairment and disability. A significant contributor to the problem behaviors and adverse health consequences experienced by adolescents are, to a larger extent, owing to the lack of developmental assets (Benson et al., 1998; Leffert et al., 1998; Scales, 1999; Scales, Benson, Leffert, & Blyth, 2000; Sesma & Roehlkepartain, 2003; Valois, 2003; Valois, Zullig, Huebner, & Drane, 2009).

Trends in Youth/Adolescent Developmental Assets

The dynamics and direction of youth development is influenced by relationships between the individual and his or her environmental context (Theokas & Learner, 2006). Developmental systems theory suggests that ▶ human development is bidirectional, individual-environmental relational process with multiple individual factors and different levels of organization within the ▶ social ecology, and emphasizes the plasticity of human development (Theokas & Learner, 2006). Fostering adaptive regulation between the individual and the multiple contexts of

development (e.g., family, peer group, school, and community) can be an important process for increasing the likelihood of positive youth development and adolescent thriving (Theokas & Learner, 2006).

Recent research suggests that supportive schools, families, communities, and peer groups are imperative for positive youth development and well-being during adolescence (Benson & Scales, 2009; Li, Lerner, & Lerner, 2010; Paxton, Valois, Huebner, & Drane, 2006; Scales, Benson, & Mannes, 2006). As part of the adolescent developmental process, they function in ever-expanding social environments and gradually move away from the family and toward their respective peer groups. In turn, relationships in community and school contexts (Wigfield, Byrnes, & Eccles, 2006), in essence, the external social environment, increase in adolescent importance. In this regard, caring and supportive adults, school connectedness, prosocial peer friendships, and living in a supportive neighborhood are assets advantageous to positive youth development (Wright & Matsen, 2005).

The adolescent peer group and school environment are important influences on youth development that represent significant social relationships outside the family (Luciana, 2010). Previous research suggests that high levels of connectedness to school can be a protective factor for adolescents and related in a positive fashion to ▶ self-esteem, academic engagement and ▶ achievement, and motivation (Anderman & Freeman, 2004). School connectedness should be considered an important factor in micro- and macro-youth development initiatives vis-à-vis its influence on emotional and social growth and academic success.

Relatively recent research points to the importance of caring and supportive adults in neighborhoods and communities for promoting positive youth development (Battistich, 2005; Scales et al., 2001). Benson (2003) suggests that neighborhoods and communities are ecological systems that play an important, but largely unrecognized role in positively influencing youth development throughout the adolescent development period. According to Baumeister and Leary (1995), both healthy youth development and well-being are inextricably linked to a ▶ sense of belonging, connectedness, and active participation in neighborhood and community group activities. In one study by Theokas & Learner, (2006), the ecological asset of self-reported community connection was significantly and positively correlated with several behavioral indicators of human thriving to include high expectations for oneself, and having a positive self-identity. Limited research to date suggests that both personal and ecological developmental assets are critical for youth to flourish and thrive in life (Benson & Scales, 2009; Li et al., 2010; Scales et al., 2006).

A recent study by Zullig, Valois, and Horn (2012) examined associations between youth assets and adolescents' sports participation among 4,097 public high school students. Participants completed a questionnaire measuring youth assets/sport participation. Multiple logistic regression analyses were conducted across four race/gender groups controlling for SES and age. All race/gender groups were between 1.39 and 1.91 times ($p < 0.01$) more likely to report sport participation if they reported accountability to parents/other adults. In addition, White females (OR = 1.48) and Black males (OR = 1.46) were at greater odds for reporting sport participation if they reported empowerment and quantity of adult support ($p < 0.001$), White adolescents (OR = 1.33 − 1.46, $p < .01$) and Black males (OR = 1.31, $p < .05$) for self/peer values regarding risk behavior, and Black females (OR = 1.22, $p < .05$) for perceived school support. Zullig et al. (2012) suggest that further research is necessary to identify the particular characteristics of youth and school sport programs that will most facilitate adolescents' acquisition of these important developmental assets.

Previous studies using the Minneapolis-based Search Institute Developmental Asset Framework (Leffert et al., 1998) indicate that youth with greater assets at their disposal are significantly less likely to report tobacco use (Atkins, Oman, Vesely, Aspy, & McLeroy, 2002), risky sexual behavior (Evans et al., 2004), alcohol and drug use (Oman et al., 2004), and violent and aggressive behavior (Aspy et al., 2004).

Furthermore, a cumulative effect was consistently noted from this research, indicating that the more assets children and adolescents possessed, the greater the protection from health risk behaviors and the greater the opportunity they had to acquire positive developmental outcomes.

Perceived Quality of Life: Life Satisfaction

▶ Perceived quality of life [PQOL] is an important construct for understanding psychological well-being and for overall mental health promotion (Diener & Deiner, 2009; Proctor, Linley, & Maltby, 2009). PQOL can include either emotional responses to events, such as feeling positive emotions or cognitive judgments such as ▶ life satisfaction [LS] (Diener & Deiner, 2009). In the field of positive psychology, LS is an important construct owing to its close association with a wide array of positive personal, social, behavioral, and psychological outcomes (e.g., Diener & Diener, 2009). Historically, ▶ subjective well-being [SWB] research in general, and LS research in particular, has been mostly limited to studies of adults (Huebner et al. 2004) while comparatively limited research has explored LS in children and adolescents (Huebner et al. 2004).

The distinction between LS and measures of psychopathology is important because LS measures have been found to be related to, but distinct from, traditional measures of psychopathology (Huebner, 2004). Research on LS has supported the positive psychology orientation that defines mental health – as more than the absence of psychopathological symptoms (Huebner, Seligson, Valois, & Suldo, 2006). Specifically, LS is a broad construct with a wide network of correlates, which shows ▶ discriminant validity in relation to measures of psychopathology. For example, although measures of LS and depression are moderately correlated, general or overall LS is distinguishable from depression in that it shows different correlates (e.g., gender) and appears to be a prodromal indicator of depression, showing decreases before clinical levels of depression becomes apparent (Lewinsohn, Redner, & Seeley, 1991). Similarly, LS is distinguishable from low self-esteem (Huebner, Gilman, & Laughlin, 1999). In turn, an adolescent can be satisfied with her or his life, but concurrently experience symptomatology (Antaramian, Huebner, Hills, & Valois, 2010).

Relationship Between Youth/Adolescent Developmental Assets and Perceived Quality of Life (Life Satisfaction)

Current and previous research has documented life satisfaction [LS] as a positive indicator for numerous aspects of well-being in adolescents (Proctor et al., 2009) to include social relationships, positive personality characteristics, health and psychopathology, life events, and living environments. In a 2003 review of the literature, Gilman & Huebner suggest that high levels of LS are positively related to interpersonal relations, positive relations with parents, and hope (for the future) and negatively associated with ▶ anxiety, depressive symptoms, and a negative attitude toward school and school teachers. However, Valois et al. (2009) posit that there is a general lack of research investigating the relationship between LS and assets in child/adolescent development, such as perceived support from adults and teachers, prosocial peers, school support, empowerment, adult bonding, meaningful neighborhood roles, empathetic relationships, and positive relationships.

A clever study on an ethnically diverse sample of 1,402 early adolescents, exploring LS and developmental assets, was conducted in western Canada by Oberle, Schonert-Reichl, & Zumbo in (2010). These researchers conducted a study with a stratified random sample of 4th–7th grade students in 25 public schools using neighborhood level vulnerability rates for children's vulnerability for the stratification process. From self-reported data, Oberle et al. (2010) found that (personal) ▶ optimism, perceived parental support, positive peer relationships, school connectedness, and perceived neighborhood support to be significantly and positively predicted higher levels of LS with early adolescents. Oberle et al. believe that their most important finding is that supportive and positive relationships with peers, non-related adults in the community, and

a strong sense of school belonging were related to LS, a critical aspect of happiness in early adolescence. The Oberle et al. findings are important because they identify critical sources for fostering positive youth development outside the family unit, and are especially relevant when taking into consideration the large amount of time early adolescents spend with their peers, in school, and in their communities.

In 2009, Valois, Zullig, Huebner, & Drane conducted a study exploring the relationships among LS and seven youth developmental assets in a large ($n = 3{,}477$) statewide study of Caucasian and African-American adolescents in the USA.

Valois et al. (2009) utilized the Brief Multidimensional Student Life Satisfaction Scale (Seligson, Huebner, & Valois, 2003) and seven subscales (34 items) from the Search Institute's Youth Developmental Asset Framework (Leffert et al., 1998) to include perceived support by parents/other adults, accountability to parents/other adults, perceived empowerment, perceived school support, self/peer values regarding risk behavior, quality of other adult support, and empathetic relationships. The Valois et al. (2009) study was large enough to conduct the analysis by four race gender groups (black males, black females, white males, and white females) and owing to the fact that African-American students reported overall lower LS in smaller studies of elementary (Terry & Huebner, 1995) and secondary level students (Dew & Huebner, 1994).

Also, research from the developmental assets literature (e.g., Leffert et al., 1998) revealed some gender and gender-by-age differences in the number of developmental assets that youths report. Findings revealed that girls reported more assets than boys, and both girls, but especially boys, exhibited a decline in self-reported assets across adolescence. For the Valois et al. (2009) study, analyses were conducted to examine relationships between developmental assets and perceived LS while controlling for socioeconomic status. Results indicated that significant ($p \leq 0.05$) associations were established for perceived support by parents/other adults for all four race/gender groups, self and peer values regarding risk behavior for Black females, quality of other adult support for Black males and White females, and LS for adolescents. Significant ($p \leq 0.05$) associations were also established for perceived support by parents/other adults for White males and Black males, accountability to parents/other adults for White females, quality of other adult support for White males and Black females and for empathetic relationships for all four race/gender groups. Results suggest that perceived LS is related to youth developmental assets, although moderated by gender and race differences. Further research is necessary to identify the particular characteristics of youth and specific aspects of adolescent life satisfaction associated with youth developmental assets in order to develop gender appropriate and culturally sensitive health promotion programs. In a general sense, results from the Valois et al. study provide support for the notion that perceived LS is associated with the presence of selected developmental assets in adolescents in the predicted directions. In particular, five of the seven developmental assets measured in this study were associated, for one or more of the four race/gender groups, to perceived life satisfaction. Given that the nature and number of developmental assets that adolescents possess is related to their tendencies to avoid or reduce their engagement in health risk behaviors, acquire other positive developmental outcomes, and improve their satisfaction with life, research that adds to the understanding of the critical thresholds needed to benefit from relevant developmental assets is particularly needed. For example, given that the absence of accountability to parents was related to LS more than its presence, future research should attend to specifying the "cutoffs" necessary to determine the needed level of accountability to parents/other adults to prevent significant LS in youth. Most importantly, though, these findings suggest that the relationships differ for different genders and ethnic groups, suggesting that some developmental assets are more critical for the LS of some students compared to others. Future research needs to address mechanisms that might elucidate the gender differences in the relationships

between LS and developmental assets in adolescence. For example, developmental assets may address different psychosocial needs in adolescent females versus males. Females show greater needs for intimate relationships (McAdams & Losoff, 1984), which are related to higher LS (Huebner, 1997). Perhaps an increase in internal developmental assets could provide female adolescents with the opportunity to meet interpersonal needs, which results in increased LS. Thus, researchers might investigate whether health promotion programs which include a social component (e.g., cooperative activities with peers) are more essential to effectiveness for female adolescents versus male adolescents. Males, on the other hand, may benefit from increased developmental assets in a more direct manner – experiencing enhanced LS in association with a variety of youth developmental activities, not only those that involve perceived support by parents/other adults and positive peer association, but community improvement activities and perhaps team sport activities. In the Valois et al. (2009) study, it seems noteworthy that Black females' LS was especially/significantly affected by self/peer values regarding risk behavior, suggesting that peer group dynamics should be a critical factor in designing health promotion/self-improvement programs for Black females. In addition, "other adult" support was important for Black (but not White) males and White (but not Black) females, suggesting that this developmental asset is imperative for health promotion/self-improvement intervention with specific race/gender groups.

In a longitudinal study exploring the link between LS and dimensions of student engagement in a sample of 799 middle school students in South Carolina, USA, Lewis, Huebner, Malone, and Valois (2011) found a significant and bidirectional relationship between cognitive engagement and life satisfaction. Specifically, higher LS in the beginning of the school year significantly predicted stronger beliefs in the importance of school five months later. In addition, Lewis et al. (2011) study found students with higher LS also reported feeling more connected to school and reported liking school more.

In a 2006 cross-sectional study, Paxton, Valois, Huebner, & Drane investigated the relationship between early adolescent LS and bonding to adults/developing meaningful roles in the neighborhood. This study was a component of the statewide CDC Middle School Youth Risk Behavior Survey for South Carolina, USA. Overall, 43 % of students reported that they were satisfied with their lives overall, and 34 % reported that they experienced positive adult relationships and meaningful roles in their neighborhoods. After adjusting for socioeconomic status and family structure, differential associations were found between adolescent LS and bonding to adults/developing meaningful roles. Paxton et al. (2006) found that opportunities for adult bonding and meaningful roles in the neighborhood related to increased LS more strongly for Caucasian students compared to African-American middle school students. Post-hoc analyses suggested that the explanation for these differential relationships more than likely involves socioeconomic status.

Zullig, Valois, Huebner, and Drane (2005) explored the relationships between perceived LS and family structure among 5,021 public high school adolescents using the self-report CDC Youth Risk Behavior Survey (YRBS) in South Carolina, USA. The study sample size was large enough to conduct the analysis by four race/gender groups: Black males, Black females, White males; and White females. Previous research on LS suggests that race and gender differences exist for adolescents (Dew & Huebner, 1994; Terry & Huebner, 1995). Adjusted multiple logistic regression analyses and multivariate models (via SUDAAN) constructed separately revealed significant race-by-gender effects. Living with other relatives, nonrelatives, or guardians was significantly related ($p < .01$) to reported life dissatisfaction for all race and gender groups, except Black males. However, White females and males living with both parents were significantly less likely ($p < .001$) to report dissatisfaction with life. Black females living with their mothers only were also significantly less likely ($p < .001$) to

report dissatisfaction with life while Black males living with their fathers only and White females living with their mother and another adult/adults were significantly more likely ($p < .01$) to report dissatisfaction with life. Differing family structures appear to exert disparate effects for LS on adolescents as a function of race and/or gender. Zullig et al. (2005) suggest that a particular health promotion intervention may not benefit all adolescents. Intervention efforts must be tailored to adolescents' specific race and gender characteristics.

Discussion

This entry suggests that a substantial number of adolescents are reporting dissatisfaction with their lives. Further, a substantial number of adolescents are lacking in developmental assets. Most importantly, this entry demonstrated a meaningful linkage between two distinct adolescent health research literatures: the developmental asset literature and the ▶ quality of life (life satisfaction) literature. Research efforts bridging the two areas have been scarce (Valois et al., 2009); however, this entry identified significant positive relationships between self-reported LS and optimism, perceived parental support, positive peer relationships, school connectedness, perceived neighborhood support, interpersonal relations, positive relations with parents, and hope (for the future), in addition to perceived support by parents/other adults, accountability to parents/other adults, perceived empowerment, perceived school support, self/peer values regarding risk behavior, quality of other adult support and empathetic relationships, student cognitive engagement, bonding to adults/developing meaningful roles in the neighborhood, and positive family structure. This entry found negative associations with LS and anxiety, depressive symptoms, and a negative attitude toward school and school teachers. Furthermore, this entry demonstrated the importance of two contextual factors as moderators of the relationships between LS and developmental assets. That is, the nature and magnitude of the developmental assets and LS associations are significantly influenced by both adolescent gender and ethnicity (while sometimes controlling for SES and grade).

This entry furthers our understanding of the importance of LS as it relates to important developmental assets representing key contexts in which youth development evolves (Huebner, Suldo, & Valois, 2005). An important aspect of assessing LS in adolescence is that it can be used to monitor well-being over time and be a strong component of the evaluation of preventive interventions for promoting positive psychological adjustment in adolescents.

From a macro-perspective, results from this entry are in line with Proctor et al.'s (2009) assumption that positive ▶ social interactions in all core developmental contexts play a key role in adolescents' satisfaction with life. In turn, the key is to engage emerging adolescents and teens in supportive relationships at school, home, in neighborhoods and communities, and in other important social settings where adolescents are active participants (e.g., volunteering, sport teams). This entry also suggests that LS can be best explained when including indicators from several important contexts of children's and adolescent's development (Gilman & Huebner, 2003). Results from this entry can inform prevention interventions in communities and schools as it identifies important relationships that can be fostered and strengthened while contributing to adolescent social and psychological well-being and throughout the lifespan.

Future Research

Future studies on YDA and LS should include objective measures of neighborhood assets, such as social efficacy, social capital and social ties (Oberle et al., 2010), and social ▶ self-efficacy (Muris, 2002; Zullig, Teoli, & Valois, 2011) and emotional self-efficacy (Muris, 2002; Valois, Umstattd, Zullig, & Paxton, 2008; Valois & Zullig, 2013). Sophisticated youth development intervention research with randomized controlled trials is needed to determine the effect of increasing adolescent developmental assets and LS on long-range health and well-being. Research studies in the future need to further explore LS for differences among gender, ethnic groups, at-risk

groups in rural vs. urban settings. Longitudinal designs are also needed for LS and developmental asset studies in order for researchers to investigate fluctuations in LS over the adolescent developmental period and examine the behavioral and developmental asset covariates over time. More research is needed in regard to how developmental assets are related to emotional and social well-being in adolescence, and this entry supports the position that supportive and positive relationships with related and non-related adults in the neighborhood and community coupled with a good level of school connectedness are essential in determining adolescent quality of life, LS, and ▶ happiness.

This entry suggests that adolescents are at a developmental advantage when they are immersed into a community that includes caring adults, prosocial peers, and positive school community interactions similar to the ASCD "Whole Child" and "Healthy School Communities" approach (Valois, Slade, & Ashford, 2011). When approaches to positive youth development are systematic and coordinated, "the village" can more effectively raise healthy and academically successful children and adolescents (Valois, 2003; Valois & Zullig, 2009).

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Life Satisfaction Assessments

► Life Satisfaction Judgments

Life Satisfaction in Australia

► Australia, Personal Well-Being Index

Life Satisfaction in China

► China, Personal Well-Being Index

Life Satisfaction in the Oldest-Old

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Synonyms

LSI-A: life satisfaction index; Stability-despite-loss paradox

Definition

► Life satisfaction is commonly defined as a subjective cognitive judgmental appraisal of one's life as a whole and represents one of the components of ► subjective well-being (Diener, 1984).

The age group of the oldest-old includes individuals aged 85 and over and is the fastest growing age group in industrialized countries.

Description

Within gerontology research, the study of life satisfaction represents a shift in perspective from the focus on negative aspects of aging such as ill-health and depression to a focus on positive aspects such as ► health and ► quality of life.

One of the earliest and still most frequently used inventories developed to measure life satisfaction in older adults is the LSI-A: Life Satisfaction Index (Neugarten, Havighurst, & Tobin, 1961). In contrast to the initially proposed five-factor solution of the LSI, confirmatory factor analysis of the scale has in several studies resulted in three factors: *mood tone* representing satisfaction with present life, *zest* representing future orientation, and *congruence* representing past satisfaction with life (Fagerström, Lindwall, Berg, & Rennemark, 2011; Hoyt & Creech, 1983; Lyyra, Tormakangas, Read, Rantanen, & Berg, 2006). The three factor solution of the LSI captures a time perspective that is believed to be of particular importance in addressing life satisfaction in advanced age.

Several studies have addressed the topic of change in life satisfaction in older adults and found life satisfaction to be stable or even increase until the ages of 70–80 (Baird, Lucas, & Donnellan, 2010; Gwozdz & Sousa-Poza, 2010; Pinquart & Sorensen, 2000), and a majority of studies have found a decrease in the oldest-old (Berg, Hoffman, Hassing, & Johansson, 2009; Mroczek & Spiro, 2005). Noteworthy, population studies that have followed participants until death, thereby allowing a distance-to-death time metric of change, have found mortality to account for a larger proportion of the variation in change in life satisfaction as compared to an age-based time metric (Berg, Thorvaldsson, Hassing, & Johansson, 2011;

Gerstorf, Ram, Rocke, Lindenberger, & Smith, 2008). Within the group of the oldest-old, the proximity to death varies among individuals and will contribute to heterogeneity of health and functioning and even life satisfaction. Thus, life satisfaction could be explained by distance to death rather than distance from birth, and the age-related decline in life satisfaction is therefore probably less pronounced than previously assumed. The identified stability of life satisfaction in the context of deteriorations in health and functioning that typically comes with advanced age has been described as the *stability-despite-loss paradox* (Mroczek & Kolarz, 1998).

Specific determinants of life satisfaction the oldest-old has been the focus in several studies, and surprisingly, the age-related condition widely expected to be a precursor, deteriorated health and functioning, has shown only a weak association to life satisfaction in studies using medically based measures of health (Smith, Borchelt, Maier, & Jopp, 2002; Berg, Hassing, Johansson, & McClearn, 2006; George, 2010; Gwozdz & Sousa-Poza, 2010). On the other side, perceived health is closely related to life satisfaction (Berg et al., 2006; Gwozdz & Sousa-Poza, 2010; Smith et al., 2002). Besides the impact of age-independent influences of genetic components and personality, the important factors in the oldest-old seem to be those related to psychosocial factors such as internal locus of control (Berg et al., 2011; George, 2010) and close relationships (Pinquart & Sorensen, 2000; George, 2010; Berg et al., 2006). Also, social, aging-related life events such as loss of spouse have pronounced effects on life satisfaction, although this effect has been found to vary across individuals (Mroczek & Spiro, 2005). Due to the dominance of cross-sectional in the research of life satisfaction in the oldest-old, we still know little about the causal relationships between determinants and outcome.

The oldest-old is the fastest growing age segment of the population in industrialized countries, but at the same time, it is the group characterized by greatest heterogeneity concerning health and functioning, and it is a future challenge for health care to contribute to sustain aging individuals' life satisfaction.

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Life Satisfaction Indicators

► National Well-Being Indicators

Life Satisfaction Judgments

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Synonyms

Life satisfaction assessments; Satisfaction with life as a whole

Definition

A life satisfaction judgment is the assessment a person makes of how well his or her life is going overall. Life satisfaction judgments figure centrally in well-being theories of philosophers and psychologists.

Description

In psychology, life satisfaction is thought to be one of the main components of subjective well-being (Diener, 1984). Psychologists measure life satisfaction with tools such as the satisfaction with life scale (SWLS). This scale asks people to agree or disagree with statements such as "I am satisfied with my life" and "The conditions of my life are excellent" (Pavot & Diener, 1993). People answer these questions by making and reporting life satisfaction *judgments*. Therefore, life satisfaction judgments are *evidence* for life satisfaction itself.

In philosophy, the main proponent of a life satisfaction theory of well-being, L. W. Sumner, takes there to be an even closer relationship between well-being and life satisfaction. According to Sumner (1996), well-being is simply life satisfaction under certain conditions. If a person has a high degree of life satisfaction, as long as the satisfaction is not based on misinformation or caused by a subversion of autonomy, then he or she is achieving well-being. Also, according to Sumner (1996, 145), being satisfied with your life "means having a certain kind of positive attitude toward your life, which in its fullest form has both a cognitive and an affective component." The affective component of life satisfaction is downplayed by psychologists, but it is important to note its presence since purely cognitive theories of happiness or of well-being seem implausible.

If we think of life satisfaction judgments as the expression of a state of mind in which you feel good about how your life is going and think that it is measuring up to your own standards, we can see what is attractive about thinking that life satisfaction judgments are closely tied to well-being. First of all, the state of mind we are in when we make positive judgments of life satisfaction is a pleasant one. Secondly, the standards of correctness for these judgments are relative to individuals, which helps to explain how well-being is good *for* the person whose well-being it is. Life satisfaction is a subjective state, and judgments of life satisfaction are subjective reports. For those who think well-being is a distinctly subjective value, this is an attractive feature.

Despite these attractions, there are some serious objections to the idea that life satisfaction judgments have a significant role to play in theories of well-being. The first is a measurement problem that targets psychologists' use of scales like the satisfaction with life scale. Psychologists have argued that how people respond to the items on this scale is affected by irrelevant factors

(Schwarz & Strack, 1999) such as the weather or the order of items on a list of questions. Critics take the evidence that life satisfaction judgments are sensitive to irrelevant features of context to show that there is no stable mental state of life satisfaction that these judgments are tracking. The problem is that we take well-being to be relatively stable; it is not supposed to be something that varies with the weather.

Psychologists in the life satisfaction camp have countered by arguing that life satisfaction judgments are, in fact, relatively stable. Stability is due to the fact that life satisfaction correlates with domain satisfaction: people who are satisfied in the domains they think are most important report high overall life satisfaction consistently (Schimmack & Oishi, 2005). These psychologists believe that life satisfaction judgments are indeed tracking a stable attitude of satisfaction with life that is responsive to how things are going in important domains.

There are two other problems with the idea that life satisfaction judgments are key to well-being that are not solved by arguing that these judgments are stable across time. The second is that life satisfaction might be "scarce" or rarely experienced, and if it is, then it will turn out that according to the life satisfaction theory of well-being, people are rarely doing well or badly or anything at all – they just do not have any of the relevant attitudes (Haybron, 2008). This certainly seems odd. Life satisfaction theorists might respond by arguing that what matters is the disposition to make positive assessments of one's conditions of life, that is, to be in the state such that you would rate your life satisfaction highly if you were asked to think about it. However, this response invites other worries because it seems to divorce the state relevant to well-being from our actual experiences.

Third, critics have argued that life satisfaction judgments are problematically *arbitrary* in at least two ways (Haybron, 2008). One, life satisfaction judgments are responsive to norms for how we ought to feel about our lives. For example, Joe might think that he ought to be satisfied with his life, even though his opportunities have been sadly curtailed by the racism in his society, because he believes in the value of gratitude and acceptance. Two, it makes a difference to whom we compare ourselves when we make life satisfaction judgments. If an average westerner reflects on the lives of undernourished children in communities without medical care or education, she might think that her own life is going very well. However, if the person thinks about her wealthy neighbors who can afford lavish vacations and private schools while she is struggling to pay her mortgage, she might assess her life as going less well. There is some empirical evidence that people's judgments are indeed subject to perspective shifts such as these (Schwarz & Strack, 1999).

If life satisfaction judgments vary depending on ethical norms and perspective, which norms and which perspective are the right ones? If this question cannot be answered, then life satisfaction theories of well-being look to be saddled with the unintuitive conclusion that well-being varies arbitrarily. Some defenders of the life satisfaction theory have tried to answer this question by appeal to idealized conditions of life satisfaction which must be met in order for it to count as well-being. Sumner (1996) does this by appeal to the norms of information and autonomy, Tiberius and Plakias (2010) appeal to the notion of appropriate values.

Whether or not the problems for philosophical life satisfaction theories of well-being can be solved, measuring life satisfaction by asking people to make life satisfaction judgments seems unlikely to go away. Fortunately, we can agree that life satisfaction judgments tell us something important even if we do not accept a life satisfaction theory of well-being. After all, given its initial attractions, life satisfaction is likely to be a component of well-being even if it does not represent the whole of it.

Cross-References

- ▶ Satisfaction with Life Scale (SWLS), an Overview
- ▶ Subjective Well-Being

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Life Satisfaction Measure

► Satisfaction with Life Domains Scale for Cancer (SLDS-C)

Life Satisfaction of Adolescents

► Child and Adolescent Life Satisfaction

Life Satisfaction of Algerian Secondary School Students

► Algerian Secondary School Students, Application of the Personal Well-being Index (PWI)

Life Satisfaction of Children

► Child and Adolescent Life Satisfaction

Life Satisfaction of Gifted American College Students

► Gifted American College Students, Application of the Personal Well-being Index (PWI) (Adult Version)

Life Satisfaction of Portuguese Adolescents

► Adolescents in Portugal

Life Satisfaction of Youth

► Child and Adolescent Life Satisfaction

Life Satisfaction Ratings and Response Formats

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Synonyms

Extreme response bias; Halo effects; Response options bias; Response style effects; Scale categories effects; Scale label effects; Scale orientation effects; Scaling-effects bias

Definition

The aim of this entry is to survey the effects of variations in scale orientation and the type of response format on the respondent's response on self-report rating scales for measuring overall ► life satisfaction.

Description

Self-report rating scales are one of the most common methods to assess overall life satisfaction. A rating scale, like all other measurement tools, is useful only if it provides an unbiased, reliable, and valid measure. A summary of some of the common methodological biases that are considered to affect measurements of QOL is presented below.

Sample selection bias takes place if participants are systematically different from nonparticipants (i.e., individuals selected for research can, and frequently do, refuse to participate).

Experimenter, *interviewer*, *and observer* bias refer to experimenters' expectation influence results.

Measurement bias occurs when the measurement of some aspect of ▶ quality of life systematically skews the responses in a particular direction.

Agreement bias, also referred to as acquiescence response style (Martin, 1964), is a tendency to agree with statements, irrespective of the content of the item. *Agreement bias* occurs when individuals differ in their tendency to agree with item statements. Such bias adds individual variation over and above variation in the construct being measured. *Disacquiescence* response style, also referred to as disagreement bias or nay-saying, is the opposite of acquiescence response style and could be caused by stimulus-avoiding introverts (Couch & Keniston, 1960). *Net acquiescence response style* (Baumgartner & Steenkamp, 2001) is the sum of these two response styles and is also referred to as direction bias.

Noncontingent responding is the tendency to be careless, random, or nonpurposeful in responding (Baumgartner & Steenkamp, 2001) and may occur because of lack of ▶ motivation.

Social desirability, a tendency to present oneself in a favorable light, can similarly lead to additive or correlational systematic error.

Standard deviation *error*, a tendency to use a wide or narrow range of responses, can increase or reduce spread. If individuals vary consistently in standard deviation, this pattern leads to within-measure correlational systematic error (i.e., consistent differences across individuals over and above the construct being measured).

Primacy effects occur when an item placed at the beginning of a list has a higher likelihood of being selected over other items in the list, and *recency effects* occur when items at the end of a list are more likely to be selected.

Location bias occurs when individuals differ in the manner in which they use response scale categories (e.g., a tendency to scale upward or use extremes).

Leniency is the tendency of a respondent to rate too high or too low. *Severity* (*or stringency*) is the opposite of leniency.

End-aversion bias, which is also called the *central tendency bias*, refers to the reluctance of some people to use the extreme categories of a scale. The effect of this bias is to reduce the range of possible response.

Midpoint responding, a tendency to use the middle scale point irrespective of content (Baumgartner & Steenkamp, 2001), may be caused by evasiveness, indecision, or indifference (Schuman & Presser, 1981).

The "*scaling-effects* bias" includes the phenomenon that respondents who assume that the midpoint of the scale reflects an "average" will compare themselves to that average (Schwarz & Hippler, 1987). *Extreme response* style refers to choosing extreme responses irrespective of content.

The *halo effect* is the tendency to rate someone high or low in all categories because he or she is high or low in one or two areas. Halo effect (is a phenomenon first recognized 80 years ago) also causes within-measure correlational systematic error and is a tendency to provide similar responses across items that are thought to be related.

Standards of Evaluation: Using categories such as fair, good, and excellent as the scales, verbal points may affect the way applicants respond to the questions because the meanings of these words can differ from person to person.

Rating scales differ in the number of categories as well as in the number and placement of

labels to aid in selection of a category. A "label" is a verbal, descriptive statement that can be placed at various locations along vectors of possible response options. Frequently, these options are numbers of increasing and/or decreasing magnitude. The respondent's task is to select the numerical response option associated with the appropriate label that he/she perceive to be the best representation of his/her attitude or belief on a latent trait. A rating scale can be presented in one of two horizontal or vertical orientations. Other features that lead to countless variations in the presentation of a rating scale include the following: whether the scale has a labeled midpoint, whether it is symmetrical or not, if it has gradations or numbers (numerical rating scales), whether it is straight or meter shaped (curvilinear analogue scales), if the scale is presented with descriptive terms at intervals along a line (graphic rating scales or Likert-type scales), etc. However, some investigators suggested that the type of response format and the scale's orientation may affect the respondent's response.

Response Format-Related Factors

There are several characteristics of response formats that are of relevance to the quality of survey data, ranging from the labeling of response categories and the issue of administering scales with or without midpoints to the question of whether response categories are ordered from positive to negative or the other way around.

Number of Rating Points

In light of the extensive use of rating scales, it would be also useful to have a clear understanding of how to optimize ▶ reliability and validity through use of the scale. The number of rating points used on the "ruler" can vary from 2 to 100 or more. There is a general consensus that the optimal number is from 5 to 7 points. But the specific number of points eludes researchers. Whether to use an even or odd number of categories is another source of debate among practitioners (e.g., Gable & Wolf, 1993). Cox (1980), p. 408 provides the following definition of optimal number of rating points: "At a general level, a scale with the optimal number of response alternatives is refined enough to be capable of transmitting most of the information available from respondents without being so refined that it simply encourages response error. At that optimal number, the ratio of meaningful or systematic variation on total variation is maximized. At an operational level, the optimal number depends on the purpose of the scale and thus the nature of its systematic variation."

Scale Labels

Compared to the research on the number of scale points necessary to maximize reliability, effects of scale labels on rating responses have not been examined as extensively. Frisbie and Brandenburg (1979) varied the type of evaluation scale labels (verbal and numerical) and the degree of labeling (all the ordered response points labeled versus only the endpoints labeled). They collected responses from a large sample (approximately 900 students in each of the four conditions) on an eight-item measure of college freshmen expectations. Each form contained a mix of 4- and 5-ordered response categories. No differences were noted in the scale means for the verbal and numerically anchored forms, but the forms with end-only anchoring resulted in higher mean ratings (more positive) compared to when all the ordered response categories were anchored. They concluded that bipolar adjective scales may tend to yield higher (more positive) ratings than content-parallel item stems with fully defined scales. In the absence of a suitable criterion, it is impossible to determine which of the two formats is more valid (p. 47).

Intermediate and Endpoint-Labeled Response Format

Lam and Klockars (1982) proposed that the difference in ratings between scales having all intermediate points labeled and those having only endpoints labeled, as observed by Frisbie and Brandenburg (1979), is a function of the locations of intermediate labels on the continuum being measured. In the case of the scale with the intermediate points labeled, subjects will choose a label at the point on the continuum closest to their actual position on the same continuum

because subjects are primarily content bound in their choice of response alternatives. However, when the psychological continuum has only the endpoints labeled, subjects will attach meaning to the alternatives by partitioning the distance between the endpoints into equal units. In other words, scales with only endpoints labeled produced results similar to scales with equally spaced response labels. Subjects tend to mentally divide the response categories into equal units, thereby creating an ▶ interval scale. The equal interval properties of a rating scale were dependent on an appropriate choice of labels to anchor the points on the rating scale.

Dixon, Bobo, and Stevick (1984) reviewed several studies where different techniques were used to label the response categories. Techniques consisted of various combinations, such as labeling all categories versus labeling only categories at the end of the response continuum, verbal versus numerical labels, and vertical versus horizontal labels. For the data gathered by Dixon et al., no significant differences were found between the end-defined and all-category defined versions of items from Rotter's (1966) ▶ locus of control scale.

Scale's Orientation

In spite of the high correlation between *vertical* and *horizontal* formats of rating scale (Stephenson & Herman, 2000), few studies comparing *horizontal* and *vertical* orientations of rating scales have produced contradictory results. For example, some researchers demonstrated that subjects usually report a higher mean score on *vertical* formats of VAS than on *horizontal* formats (Stephenson & Herman). But, Breivik and Skoglund (1998) did not find any significant differences between *horizontal* and *vertical* presentations of rating scales and concluded that vertically and horizontally oriented rating scales are equally sensitive in assessing the intensity of present ▶ pain in oral surgery.

Bipolar and Unipolar Scales

While the numeric values are often included only for coding and response convenience, Schwartz, Knauper, Hippler, Noelle-Neumann, and Clark (1991) have demonstrated that they carry more, sometimes unintended, meanings. For a particular question, "How successful have you been in life, so far?" they showed that a scale with numeric values ranging from 0 to 10 was not the same as a scale whose values ranged from −5 to +5. The verbal anchors were "not at all successful" (0 or −5) and "extremely successful" (10 or +5). They argued that when a 0 to 10 scale is used, respondents infer that 0 stands for the absence of any amount; the scale becomes *unipolar*. In contrast, respondents infer that the scale is *bipolar* when the numeric values range from −5 to +5. For example, when asking people how successful they had been in their life, if a 0 to 10 scale is offered, they will assume that the low anchor (0) corresponds to *not having any success*. This contrasts with the interpretation of the lowest point on the −5 to +5 scale as being *unsuccessful* (being a failure).

Study 1

Study 1 investigated the effects of variations in response format, differing in *polarity* (*bipolar* versus *unipolar*), scale *orientation* (*horizontal* versus *vertical*), and *anchoring* (*−5* to *+5*, *not numbered*, and *0* to *10*) on (1) overall life satisfaction and life dissatisfaction ratings, (2) the relationship between overall life satisfaction and life dissatisfaction, and (3) the relationship between overall life (dis)satisfaction and (dis)satisfaction in specific domains of life (Mazaheri & Theuns, 2009a).

A sample of 1,737 volunteering students (1,209 female, 528 male), randomly assigned to 12 different conditions, rated their current satisfaction with life (SWL) and dissatisfaction with life (DWL) using a self-report rating scale. Each condition used one of 12 rating scale formats, differing in polarity (bipolar versus unipolar), orientation (horizontal versus vertical), and anchoring (−5 to +5, not numbered, and 0 to 10) (Fig. 1).

The results of study 1 suggest that the nature of response scales may influence the assessment of overall life (dis)satisfaction, (dis)satisfaction in different domains, overall life (dis)satisfactions' correlations, as well as relationships between

Unipolar-Horizontal (0 to 10)	Not at all Satisfied	0	1	2	3	4	5	6	7	8	9	10	Very Satisfied
Unipolar-Horizontal (–5 to +5)	Not at all Satisfied	–5	–4	–2	–3	–1	0	1	2	3	4	5	Very Satisfied
Unipolar-Horizontal (Not Numbered)	Not at all Satisfied												Very Satisfied
Bipolar-Horizontal (0 to 10)	Very Dissatisfied	0	1	2	3	4	5	6	7	8	9	10	Very Satisfied
Bipolar-Horizontal (–5 to +5)	Very Dissatisfied	–5	–4	–2	–3	–1	0	1	2	3	4	5	Very Satisfied
Bipolar-Horizontal (Not Numbered)	Very Dissatisfied												Very Satisfied

Unipolar-Vertical (0 to 10)	Unipolar-Vertical (–5 to +5)	Unipolar-Vertical (Not Numbered)	Bipolar-Vertical (0 to 10)	Bipolar-Vertical (–5 to +5)	Bipolar-Vertical (Not Numbered)
Very Satisfied	Very Satisfied	Very Satisfied	Very Satisfied	Very Satisfied	Very Satisfied
10	+5		10	–5	
9	+4		9	–4	
8	+3		8	–3	
7	+2		7	–2	
6	+1		6	–1	
5	0		5	0	
4	–1		4	+1	
3	–2		3	+2	
2	–3		2	+3	
1	–4		1	+4	
0	–5		0	+5	
Not at all Satisfied	Not at all Satisfied	Not at all Satisfied	Very Dissatisfied	Very Dissatisfied	Very Dissatisfied

Life Satisfaction Ratings and Response Formats, Fig. 1 Twelve different response formats for satisfaction rating scales

overall life (dis)satisfaction and (dis)satisfaction in different domains of life. This study has confirmed, specifically, such influence in the case of bipolar and unipolar response scales. Our results indicate that satisfaction ratings using with either a unipolar or bipolar response scale were similar, but participants clearly experienced greater difficulty in rating life dissatisfaction using the bipolar dissatisfaction-satisfaction response scale. Moreover, this study has found that life satisfaction and dissatisfaction used to show a reciprocal relation with a high negative correlation when assessed with two independent unipolar rating scales. In comparison, participants were unable to rate life dissatisfaction when a *dissatisfaction-satisfaction* bipolar response scale was employed, leading to the collection of invalid data. Our findings indicated that life satisfaction and dissatisfaction were highly negatively correlated when assessed with two independent unipolar response scales. These results strongly support the inclusion of

one-way unipolar response scales in the assessment of satisfaction and dissatisfaction ratings.

Study 2

Our focus in study 2 was, using structural equation modeling, on the development and evaluation of four hypothesized models, LDR, OSWB, ODSWB, and SQOL, to predict life domains rating, overall life satisfaction, overall life dissatisfaction, and subjective quality of life, respectively (Mazaheri & Theuns, 2009b). Data were obtained from 1,130 volunteering students, who have been presented one of six different unipolar rating scale formats to rate their current overall life (dis)satisfaction and their (dis)satisfaction with six different domains of life. The results of the ▶ confirmatory factor analysis (CFA) support for the conclusion that a six-factor model of LDR can represent participants' response to the model to predict six life domain ratings (LDR) based on the satisfaction and dissatisfaction items. Further, this study found that this model applies similarly well using *horizontal* rating scales (but not using vertical rating scales) with different types of anchor points: −5 to +5, 0 to 10, and not numbered. This means that the kind of used response format for satisfaction and dissatisfaction ratings may affect the factor loadings when using the confirmatory factor analysis (CFA).

Study 3

The main aim of study 3 was to evaluate a hypothesized model on subjective quality of life (SQOL) and to survey the role of scale anchoring on satisfaction and dissatisfaction ratings (Mazaheri, 2010). The sample consisted of 456 volunteering students who were randomly assigned in to two different conditions and rated their current overall life (dis)satisfaction and their (dis)satisfaction on six different domains of life. Each condition used one of the two rating scale formats; the formats differed in anchoring (−5 to +5 and 0 to 10). In order to find how the six different domains of life combine to produce an overall measure of subjective quality of life, an SQOL model was designed, and the strength of this hypothesized model of SQOL was examined using structural equation modeling. The results of testing for multiple group invariance of the hypothesized model indicated a cross-validity for the studied model for measuring SQOL. Our results also indicated that comparing the two different response formats, only for scores derived from horizontal (0 to 10) response format, all the paths in the model were found to be significant.

Cross-References

- ▶ Happiness Measures
- ▶ Measurement Invariance
- ▶ Measurement Methods
- ▶ Satisfaction with Life as a Whole
- ▶ Test Bias

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Life Satisfaction, Concept of

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Synonyms

Satisfaction with life as a whole

Definition

Life satisfaction is an endorsement of or positive attitude toward one's life overall.

Description

The concept of life satisfaction is employed in philosophical and psychological accounts of ▶ happiness and ▶ well-being. "Life satisfaction" is regularly used as a synonym for "happiness" and is often either identified with or seen as a significant component of well-being. However, there are two distinct senses of "satisfaction" at use in these various accounts: in some accounts, "satisfaction" refers to the perceived fulfillment of expectations or standards; in other accounts, "satisfaction" refers to a feeling of being pleased with something. Because of these different senses of the term "satisfaction," there are broadly two different conceptions of life satisfaction at use in life satisfaction accounts.

Accounts using "satisfaction" in the first sense (the standard-fulfillment sense) are "cognitive" accounts of life satisfaction. In these accounts, to say that someone is satisfied with her life is to say that she judges, or is disposed to judge (Benditt, 1974), that her life meets her standards; her life is at least *adequate* or *satisfactory* given what she expects or wants out of life. This conception of life satisfaction is cognitive in that "satisfaction" here refers to the bare judgment or assessment that one's life is satisfactory; such a judgment could be made without any sort of positive feeling, mood, or emotion accompanying it. Cognitive accounts of life satisfaction can be found in Diener, Emmons, Larsen, and Griffin (1985), Pavot and Diener (1993), and Alexandrova (2008).

Accounts using "satisfaction" to refer to feeling pleased with something can be seen as "mixed" accounts of life satisfaction, because they contain both cognitive and affective elements. According to this conception of life satisfaction, to say that someone is satisfied with her life is to say that she *feels* satisfied (or is disposed to feel satisfied) with her life. What matters with regard to life satisfaction, according to the mixed conception, is that people enjoy, are pleased by, like, or otherwise feel content with their lives, in addition to judging that their lives meet their standards. Mixed accounts of life satisfaction can be found in Thomas (1968), Benditt (1974), Telfer (1980), Brandt (1989), Sumner (1996), and Tiberius and Plakias (2010).

Both conceptions of life satisfaction take "life satisfaction" to refer to a person's positive

appraisal, judgment, or endorsement of her life overall, as opposed to her appraisal of particular domains of life (such as her health, job, or friendships). While some research indicates that domain satisfaction can be predictive of life satisfaction (see, for instance, ▶ Multiple Discrepancies Theory, described in Michalos (1980)), life satisfaction is conceptually distinct from domain satisfaction in that judgments or attitudes of life satisfaction are holistic and global (Haybron, 2007; Pavot & Diener, 1993). Life satisfaction is also often seen to have a motivational aspect; someone who is satisfied with her life wants her life to go on largely as it is, or is at least disinclined to seek out change (Haybron, 2007; Kekes, 1982; Telfer, 1980; Thomas, 1968).

It is important to distinguish cognitive conceptions of life satisfaction from mixed conceptions, as each has different implications when employed as a measure of, or treated as equivalent to, happiness or well-being. For instance, a person could be satisfied with her life in the cognitive sense while also being depressed, anxious, bored, or experiencing other negative emotions. Whether or not a person is satisfied with her life in this sense depends on which perspective she takes on it, and as Haybron (2007) argues, the choice of perspective may depend in large part on values unrelated to happiness or the achievement of important goals. Even if people tend to be more satisfied with their lives when they are happier or their lives are going well in other ways, life satisfaction in the cognitive sense is conceptually distinct from both happiness and well-being. For instance, it is possible to wish for someone's happiness or well-being while *also* wishing that she did not judge her life to be satisfactory. This might happen if we think that a person's low standards are causing her to be satisfied with a life that contains a good deal of boredom, anxiety, or even depression; if she were not satisfied with her life, she might strive to make changes that would ultimately make her happier. Because of this, neither happiness nor well-being should be identified with life satisfaction in the cognitive sense. Instead, researchers employing a cognitive conception of life satisfaction often identify it as only one component of well-being (see, for instance, Diener et al. (1985) and Pavot and Diener (1993)).

Since it is possible for a person to be satisfied in the cognitive sense while living a life that otherwise seems to be lacking in much to recommend it, most authors who identify well-being or happiness with life satisfaction (rather than just stating that life satisfaction is one component of well-being) employ a mixed account of life satisfaction. Those using a mixed account in this way often enumerate certain idealizing constraints or conditions for when a person's life satisfaction "counts" as happiness or well-being (Sumner, 1996; Tiberius & Plakias, 2010).

Both the cognitive and mixed conceptions of life satisfaction are important to well-being research. The cognitive conception matters because a person's perspective on her life is a significant component of her experience of her life, and a person's judgment that her life *is not* going well is a cause for concern. Even though a person may be satisfied with her life in the cognitive sense for what we may think of as the wrong reasons, how she sees her life is arguably still an important factor in how her life is going for her – irrespective of how this judgment gets made (see Kennedy, Northcott, and Kinzel (1978), Haybron (2007), and Feldman (2008) for some of the problems that may affect ▶ life satisfaction judgments; see Veenhoven (1996) and Alexandrova (2008) for discussions of how judgments of life satisfaction are formed). Perhaps in part because it is easier to measure, the cognitive conception of life satisfaction is often the one employed in empirical research. Given the shortcomings of cognitive life satisfaction noted here, however, we should be careful not to interpret findings about life satisfaction as necessarily equivalent to findings about happiness or well-being. This is especially true if such research is then used in policy discussions about how to assess and compare national progress or where to concentrate resources for human development. We should not assume, for instance, that because two countries show similar

levels of (cognitive) life satisfaction, their citizens are doing equally well.

The mixed conception, on the other hand, is meaningful because we often care about more than whether our lives meet our standards in some "checklist" sense. We also want to *feel good about* our lives. This is not merely to say that we want both to judge that our lives are going well and to experience some sort of positive affect in our lives. A person could judge her life to be satisfactory and also regularly experience positive affect in her life while still not being satisfied *with* her life in the mixed sense. (For instance, a person could frequently be in a good mood due to her personality and judge her life to be satisfactory because of her belief that anyone with a job, a roof over her head, and enough food to eat has no reason to be *dis*satisfied, and still not feel particularly pleased with her life in the sense that is relevant here.) In mixed accounts of life satisfaction, the feelings in question are distinguished from other positive emotions or moods in that they are causally related to a person's assessment or perception of how her life is going. To say that a person feels satisfied is to say that she is happy or content *with* her life; this is a feeling that arises from the contemplation of her life, in contrast to feelings that arise for some other reason, or for no clear reason at all (Benditt, 1974). This feeling of being happy or pleased *with one's life* is a particularly important affective response to pay attention to.

Here, then, are three separate targets for measurement: a person's judgment about whether her life meets her standards, the feelings a person has that result from this judgment, and the more general affective responses a person experiences throughout her life. Each of these should be recognized as a distinct area of concern for research on happiness and well-being.

Cross-References

- ▶ Happiness
- ▶ Life Satisfaction Judgments
- ▶ Multiple Discrepancies Theory (MDT)
- ▶ Quality of Life (QOL)
- ▶ Satisfaction With Life as a Whole
- ▶ Satisfaction with Life Scale (SWLS), an Overview
- ▶ Subjective Well-Being
- ▶ Subjective Well-Being (SWB)
- ▶ Well-Being of Nations
- ▶ Well-Being, Philosophical Theories of

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Life Situation Index

- ▶ SCP Life Situation Index

Life Strains

▶ Stressful Life Events

Life Transitions

▶ Life Events

Life Worth Living

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Synonyms

Worthwhile life

Definition

A life is worth living insofar as it has enough of the right sort of goods internal to the life to outweigh the bad in it so as to make it sensible to exhibit positive orientations toward it such as being grateful for it, being glad about it, and sustaining it.

Description

The concept of a life worth living is closely related to ideas of ▶ happiness, virtue, and ▶ meaning in life, but can also be seen to be distinct from them. In this entry, I first discuss the contexts in which the idea of a life worth living is salient, after which I differentiate this idea from other value-theoretic concepts. Then, I lay out competing philosophical accounts of what in fact makes a life worth living and conclude by discussing positions according to which virtually no one's life is worth living.

We often think about whether a life is worth living or not when making major bioethical decisions. For example, healthcare professionals and patient families do so when considering whether it would be right to provide a do not resuscitate order, or whether it no longer makes sense to spend scarce resources on a critically ill patient, and to instead direct her/his toward ▶ hospice care. Judgments of whether a life is worthwhile ground decisions not only about whether to keep another alive but also about whether to stay alive oneself. Many believe that suicide would be rational and perhaps even moral if one's life were not worth living.

In addition to figuring prominently in reflection about ending life, we often invoke the value of a life worth living (and its companion disvalue) when thinking about creating life. When deciding whether to have a child or not, one invariably considers whether its life would be worth living, with most agreeing that it would be wrong to create a child whom one knew would suffer from a disease that would lead to a certain, early death after a life exhausted by extreme debilitation and ▶ pain. And when considering more large-scale, population issues, such as how many people should be on the planet and what institutions should do to influence that, it is again common for ethicists and policy-makers to think about the extent to which future people would have lives worth living.

These two contexts, of ending life and creating it, occasion awareness of ambiguity in the way many people use the phrase *life worth living*. On the one hand, if one says that life counts as worth living, one might mean that it is worth starting, while, on the other hand, one might instead mean that it is worth continuing. It could be that these two ideas amount to the same thing, so that if a life is worth starting, then it will be worth continuing and if a life is worth continuing, then it was worth starting. However, there are ethicists who have recently cast interesting doubt on that view; for instance, perhaps a life without a limb would not be worth starting but, once born, would be worth continuing (Benatar, 2006: 20–28, 212–218).

Additional distinctions merit reflection. For instance, many probably think that a happy life and a worthwhile life are equivalent (e.g., Tännsjö, 1998: 63–95), but this can reasonably be questioned. Suppose, for example, that happiness is hedonic, merely a matter of ▶ pleasure, and then imagine that a person could spend her/his entire life in a machine appropriately called the *orgasmatron* (see Woody Allen's movie *Sleeper*). Such a life might well be happy, but one could fairly doubt that it would be worth living – would you create a child whom you knew would be a whole-hearted orgasmatron addict?

Similarly, many likely assume that a meaningful life and a worthwhile life are equivalent, but, again, there are reasons to doubt this. Suppose, with many philosophers, that substantial meaning can arise from making sacrifices for the sake of others, and then imagine a person who volunteers to undergo intense suffering, or even death, so that others can avoid such. Such a person's life could have great meaning in it, but it may fairly be denied that it would be worth living, at least in the sense of worth continuing (Metz, 2012a: 443–444).

If the ideas of a happy and a meaningful life are not equivalent to the notion of a life worth living, then what is essentially involved in the latter? Elsewhere I have argued that when thinking about whether a life is worth living, we are best understood to be considering whether it has enough of the right sort of internal goods to outweigh the bad in the life so as to make it sensible to exhibit positive orientations toward it such as being grateful for it, being glad about it, sustaining it (Metz, 2012a), and perhaps even being willing to originate oneself, supposing one had that odd ability (Trisel, 2007). Pleasure is one example of an internal good that is surely relevant to some degree, but others probably include forms of ▶ self-realization, virtues, morally right actions, and relationships. Examples of external goods, probably not relevant to whether a life is worthwhile or not, include having unintended posthumous effects on others and pleasing a God in whom one never believed.

There is substantial debate among philosophers about which are the relevant internal goods that would indeed make a life worth living. Until recently, the dominant view was that a worthwhile life is one with a certain *sum* of atomistic conditions, roughly where there is a high-enough amount of good parts that outweighs the degree of bad ones (Baier, 1997: 67–69). The popular view has been that a life is worth living just insofar as the amount of pleasure, desire satisfaction, excellence, ▶ love, and so on in it is more than, or perhaps much more than, the amount of the opposites of ▶ pain, desire frustration, vice, enmity, etc.

However, recently there have been several objections to this aggregative conception of worthwhileness, with several ethicists maintaining that whether a life is worthwhile or not is at least to some degree a function of its *pattern*, roughly the way its parts are ordered or otherwise relate to one another. For example, some have argued that a life is more worth living insofar as its bad parts cause its good parts to come about (Velleman, 1991). Others have held that a life is at least somewhat more worthwhile insofar as it ends on a high note, rather than peters out (Kamm, 2003). Still others have contended that a life's worthwhileness is a function of whether it has *narrative unity*, roughly, admits of a good story (Brännmark, 2003). And, finally, others have maintained that a repetitive life, even one with lots of pleasure or desire satisfaction, would not be worth living (Blumenfeld, 2009).

Most people believe their life is worth living, whether in virtue of its parts or their pattern (or both), but there are theorists who argue that their beliefs smack of *Pollyannaism* that is a product of natural selection (Benatar, 2006: 64–69). The human race would not have been evolutionarily successful if it had had a tendency to think that life is not worth living. Now, even though is it plausible to maintain that those who have judged life to be worth living have tended to pass on their genes to a much greater extent than those who have judged otherwise, it does not necessarily follow that the former have been incorrect to positively appraise life. Why should one think that they have been deluded, failing to recognize that

whatever good is typical of a life does not justify the bad in it?

There are several arguments for *nihilism* or *pessimism* that philosophers critically explore. One springs from Arthur Schopenhauer's (1851) work according to which we are invariably dissatisfied: either we have not yet obtained what we seek, or we have obtained it and are then bored (for a recent statement, see Martin, 1993: 593–595). Another argument, also present in the work of Schopenhauer (1851) as well as in that of Leo Tolstoy (1884), is that from the *sub specie aeternitatis* (*point of view of eternity*), our lives are pitiful. Since we are so puny and far from perfection, which would include eternal bliss, no life is worth creating, and many may even be worth ending. As Prince Bismarck is reported to have said, "Without the hope of an afterlife this life is not even worth the effort of getting dressed in the morning."

In addition to these two classic rationales for finding life not to be worthwhile, contemporary philosophers have proffered new ones. One influential rationale comes from David Benatar (2006), who has argued with sophistication for what is known as *anti-natalism*, the view that we morally should not create any new lives because they would be bad for those who have to live them. Benatar invites us to compare our existence with a state in which we never existed. With regard to bads in life, we undergo them only if we exist, and not if we fail to exist. So far, then, nonexistence is preferable. And with regard to goods in life, Benatar argues that they are no real advantage relative to nonexistence, since if we had never been born, we would not have been *deprived* of the goods and so would not have missed out on anything. On the basis of these comparisons, Benatar concludes that it would be better never to exist in the first place. Note that Benatar's rationale here does not entail the *pro-mortalist* view that we should all kill ourselves or one another, since then we would typically be depriving each other, who do now exist, of goods that we can expect in the future.

Another interesting argument for a form of nihilism comes from Christopher Belshaw (2012), who maintains that although adult lives are generally worth continuing, the lives of human babies are not. Although he also does not recommend killing infants, he does support the anti-natalist conclusion that we would be wrong to create them. The difference between a baby and an adult, for Belshaw, is a matter of the psychological connections over time that are available. When an adult undergoes pain, suffering or some other bad, it need not undermine the worthwhileness of his/her life since he can see that doing so can be essential for more good down the road. Babies are incapable of such foresight; all they do is suffer in the moment. And such an existence, Belshaw contends, is not worthwhile.

Those unfamiliar with philosophical discussion might find it incredible that rationales for the view that life is not worth living are taken seriously. However, they are because they are often advanced on the basis of careful argumentation appealing to relatively uncontroversial premises. It can be a difficult and complex matter to tease out precisely where arguments for nihilism go wrong, if indeed they do (see the essays in Metz, 2012b). Even those who are resolutely optimistic I hope will have taken something useful from this entry, in which I have also worked to clarify what it means to speak of *life being worthwhile*, as something distinct from a happy or meaningful life, and sketched a variety of plausible views of what might make it worth living.

Cross-References

▶ Good Health Versus a Good Life
▶ Good Life

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Lifelong Education

► Lifelong Learning

Lifelong Learning

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Synonyms

Continuing education; Lifelong education; Recurrent education

Definition

Learning throughout the whole course of a person's life regarded as a continual and purposeful process of personal and social development in different settings aiming to develop and improve the knowledge, skills, and competencies.

Description

The concept of lifelong learning was first introduced in the 1970s. In its early development, the concept was equated with giving adults access to formal courses at educational institutions. Later on, international organizations such as UNESCO, OECD, the European Commission, and the World Bank have adopted a more comprehensive approach.

UNESCO vision on lifelong learning was initially oriented more towards the development of individuals through learning, emphasizing the ► learning to learn side more than learning within an employment-related perspective. This was at least argued in a landmark document issued in 1972, which stated that "the aim of education was to enable man to be himself" (UNESCO, 1972). A quarter-century later, with the Delors Report, UNESCO has introduced a new vision on lifelong learning as the key for building peace in the twenty-first century. This view, based on four pillars of ► education – learning to know, learning to do, learning to be, and learning to live together – has acknowledged the increasing role of lifelong learning in coping with the knowledge economy and with technological changes (UNESCO, 1996).

The OECD view on lifelong learning was built from the very beginning on the rhetoric of ► human capital development. In choosing the goal of "lifelong learning for all" in 1996, OECD Education Ministers signaled a major departure by adopting a more comprehensive view. The goal covered all purposeful learning activity, from the cradle to the grave, that aims to improve ► knowledge and competencies for all individuals who wish to participate in learning activities. The approach has four key features: it takes a systemic view of learning, is treating the learner as central, is emphasizing the ► motivation to learn, and is

recognizing education's multiple objectives (OECD, 1996).

For the European Union, lifelong learning is defined as encompassing "all learning activity undertaken throughout life, with the aim of improving knowledge, skills and competences, within a personal, civic, social and or employment related perspective." Furthermore, education and lifelong learning should include the entire spectrum of formal, nonformal, and informal learning (European Commission, 2001).

Finally, the World Bank vision on lifelong learning is that it should signify "education for the knowledge economy." Within this concept, formal education structures (primary, secondary, higher, vocational, and so on) are less important than learning and meeting learners' needs. It is essential to integrate learning programs better and to align different elements of the system, and learners should be able to enter and leave the system at different points (The World Bank, 2003).

Lifelong learning can have different meanings to different people, beyond its obvious reference to individuals of all ages continuing to learn. While views could differ about whether the concept of lifelong learning should be more precisely specified to give it greater value, its importance has helped to shift the assumptions about the nature of education in knowledge-intensive societies. It summarizes the fact that learning, which is of significance to individuals and to communities, must extend well beyond that which is organized through formal education systems, and it should certainly extend beyond what takes place during childhood.

The goal of *lifelong learning for all* originated as a strategy for continuing to educate people beyond their school years. Therefore, the "cradle-to-grave" vision of lifelong learning was substantially broader than the notions of adult education or recurrent education that previously shaped the debate on education policy. This implies that educational systems should have different objectives and characteristics than if education were considered to have been completed when a student leaves for adult and working life.

The concept of lifelong learning emphasizes that learning occurs during the whole course of a person's life: formal education contributes to learning as do the nonformal and informal settings of home, the workplace, the community, and society. The concept also shifts the responsibility for education and learning to the individual, focusing on the development of individual capabilities and the capacity to learn. At the same time, it implies a shift from traditional education institutions to diverse learning opportunities that are more process and outcome oriented. As such, the responsibility for education and learning shifts from the public (state) to nongovernmental organizations.

Lifelong learning is not simply a summing up of traditional education program and modern learning opportunities. While traditional educational institutions have been (and still are) primarily concerned with transmitting knowledge, modern learning opportunities and the lifelong learning approach put the emphasis on the development of individual capabilities and the capacity of the person to learn. It implies a paradigm shift from the dominance of traditional education institutions to a diverse field of traditional and modern learning opportunities that are more process and outcome oriented as well as of a modular structure.

A systemic approach to lifelong learning is the key, underlining motivation to keep learning, the links between different stages, resource allocation choices, and coordination – thus encompassing learning at all ages. In 2002, the Member States of the European Union committed themselves to develop national lifelong learning strategies covering all contexts (formal, nonformal, informal) and levels (preprimary, primary, secondary, tertiary, adult) of education and training (European Council, 2002).

In a systemic approach, people at each stage of life need not only to be given specific opportunities to learn new things but also to be equipped and motivated to undertake further learning, where necessary organized and directed by themselves. Curricula, pedagogical practices, and the organization of learning all need to be

examined from this perspective. Each learning setting needs to be linked to others, to enable individuals to make transitions and progress through various learning stages. Provision therefore needs to be structured in a way that creates appropriate linkages and pathways (OECD, 2001).

However, a systemic approach to lifelong learning requires a high level of coordination for developing and implementing policies. Consequently, no single ministry has a monopoly of interest in lifelong learning. It also raises questions about whether the distribution of education and training resources is optimal in promoting an individual's engagement in learning over the lifetime. Resources for education cannot be looked at only in the context of separate sectors of formal provision (OECD, 2001).

As any complex concept, lifelong learning is rather difficult to measure. The scope for measuring lifelong learning has defied traditional models of measurement, leaving the impression that lifelong learning remains an abstract concept, evading any coherent measurement framework (Bertelsmann Stiftung, 2010). Albeit this perception, some steps were taken towards measuring lifelong learning and its facets, in particular the participation patterns (Badescu & Saisana, 2008). The Canadian Council of Learning, Bertelsmann Foundation, and the Joint Research Centre of European Commission are among the institutions, which attempted to produce the first measurement instruments combining different statistical data.

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Lifestyle Deprivation in Europe

► Determinants of Poverty in Europe

Lifestyle Health Risks

► Cigarette Smoking and Drinking

Lifestyle Homogamy in Couple Relationships

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Definition

Lifestyles can be defined as comparatively stable patterns of ► activities of daily living (ADL) that are associated with expressive and symbolic meaning. They can be observed and measured as leisure activities, cultural consumption patterns, and cultural tastes (Katz-Gerro, 2004; Spellerberg, 1996, p. 57). Some authors follow Bourdieu's (1984) work by using measures of participation in highbrow and lowbrow culture activities; other classifications include the active versus passive distinction, indoor and outdoor pastimes, and individual and collective activities.

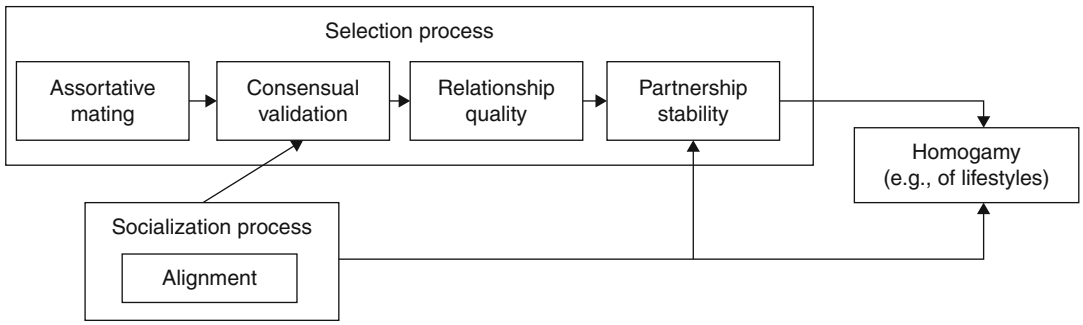
A prominent feature of lifestyles is their potential to convey group boundaries by providing individuals with group-specific identities. Common lifestyle indicators in the literature include leisure pastimes, cultural consumption, and cultural tastes related to clothing, ▶ music, reading, and choice of holidays (Featherstone, 1991; Rojek, 1985; Sobel, 1983).

Description

Lifestyles have become increasingly important as an alternative concept to conventional dimensions of social inequality such as social classes and strata and the related indicators (e.g., ▶ education or income). Whereas classical vertical dimensions of social structure such as education refer to endowment with resources, lifestyles can be conceived as the way in which resources are put to actual use. Because of societal differentiation and destandardization processes, social structural subgroups have become more heterogenous in their preferences and tastes (Hakim, 2003). Therefore, some lifestyle theorists (Schulze, 1992) argue that to characterize people with respect to their social position within a society, it is at least as important to look at what they (prefer to) do as it is to look at what status they possess (e.g., occupational prestige or income). Below, we will focus on leisure-related lifestyles because, whereas work schedules are contractually fixed and, hence, usually cannot be freely disposed of, leisure time is largely at the individual's (and, through influence processes, at the partner's) disposal and, thus, is particularly likely to vary over time.

A key function of lifestyles is that they serve to convey group-specific self-construals to the social environment, that is, they contribute to in-group cohesion and outgroup differentiation. Possibly, the integrative force of lifestyle homogamy is especially relevant for couple relationships on the dyadic level in that shared lifestyles may facilitate the formation and consolidation of partnerships. In line with this argument, partners with similar lifestyles are more likely to get married (Lois, 2008). Generally, partners in committed unions have been found to resemble each other in terms of their leisure-related lifestyles (Arránz Becker & Lois, 2010; Caspi, Herbener, & Ozer, 1992). Yet, the reasons for this are not entirely clear.

We hypothesize that two processes contribute to lifestyle homogamy: selection and socialization (for an illustration of the following theoretical arguments, see Fig. 1). The selection mechanism assumes a higher relationship success for couples with similar lifestyles. It rests on the idea that the discovery of commonalities with an interaction partner is perceived as intrinsically rewarding; this is sometimes referred to as consensual validation, a concept that can be traced back to Festinger's (1954) ▶ Social Comparison Theory. If it is true that similar others are more likely to validate our world view than dissimilar others, following the principles of learning through conditioning, individuals will feel attracted to those who are similar because of the gratifications they provide. This line of



Lifestyle Homogamy in Couple Relationships, Fig. 1 Origins of lifestyle homogamy (Source: own illustration)

thought underlies several widely known models of relationship functioning including exchange theoretical models of marital stability (Lewis & Spanier, 1979) and balance theory (Heider, 1958). Because of its inherent potential for reinforcement, we assume behavioral similarity (e.g., concerning lifestyles) to be a more proximal predictor of attraction than attitudinal homogamy.

Selection on the basis of consensual validation may be operating in different stages of relationship formation and development. During courtship, it should result in a higher rate of rejection of dissimilar mating candidates and a preference for potential partners adhering to a lifestyle similar to one's own. During the consolidation stage of the partnership, partners with incompatible leisure interests may be more likely to experience discord and dissatisfaction and thus are more likely to split up, so that similar couples are eventually overrepresented in the population. An inspection of the literature indeed reveals a close link between lifestyle similarity and ▶ marital adjustment. Crawford et al. (2002) reported that husbands' ▶ relationship satisfaction was enhanced by a high proportion of joint activities. Similarly, the more leisure time couples spent together, the more likely husbands were to report feelings of ▶ love for their spouses and engagement in activities that contributed to relationship maintenance (Houts, Robins, & Huston, 1996). Moreover, lifestyle homogamy may reduce the degree of conflict in the relationship (Surra & Longstreth, 1990) and enhances relationship quality (Logan, Kern, Curlette, & Trad, 1993). Taken together, these results are consistent with the finding that the amount of free time with the partner predicts marital stability (Hill, 1988; Surra & Longstreth, 1990). In summary, it can be expected that one factor underlying lifestyle homogamy is its self-preserving effect, mediated through relationship stability (H1).

In cases where partners are not perfectly similar from the outset, they can engage in a marital socialization process in which they align to each other and become more similar over time; alignment can be interpreted as a result of partner influence (Kalmijn, 2005). Although the topic of alignment was brought up in the theoretical literature more than two decades ago, empirical evidence concerning couples' alignment of leisure-related values and interests over time is still scarce. One exception is a study by Roest, Dubas, and Gerris (2006), dealing with spousal transmission of values pertaining to domains of different content. A small but significant positive partner effect was found for women with respect to ▶ hedonism (i.e., the tendency to enjoy life). In contrast, Caspi et al. (1992) found that despite a high resemblance of attitudes concerning marital companionship (e.g., having similar intellectual interests) within couples over a 20-year period, partner effects were insignificant. Other alignment studies are of limited relevance, either because they were conducted in an experimental setting (Davis & Rusbult, 2001) or because they address other types of attitudes such as sex-role orientations (Kalmijn, 2005). Hence, there is a paucity of research aimed at determining the role of alignment in the emergence of lifestyle homogamy. It can be hypothesized that among stable couples, partners tend to align their lifestyles to each other over time (H2).

The potential for lifestyle alignment may depend on specific preconditions. First, the extent to which shared leisure is rewarding should depend on the type of activity. Arousal might be a central moderator variable for the cohesive effect of joint activities. According to Aron and Aron (1986), physical arousal is a central precondition for the emergence of attraction; in this view, romantic love is primarily based on a misattribution of ▶ physiological arousal to the attraction to the person with whom these activities happen to be shared. Thus, lifestyle homogamy, especially with respect to "expanding," action-oriented leisure activities, should reduce the risk of divorce. Second, across the life cycle, individuals or couples repeatedly face the decision of how to allocate their time, for instance, across the family and work domains. Because family- and work-related roles compete with the (complementary) leisure time budget, the latter should be inversely related to the allocation of time to the family (e.g., reduced or

asymmetrically distributed time resources for shared leisure after the birth of a child) and to paid labor (e.g., less shared leisure after the entry into the labor market). From this perspective, most time resources should be spent on shared leisure before and after the stage of increased family- and work-related obligations. In line with this argument, a cross-sectional study by Kalmijn and Bernasco (2001) showed that couples with young children spend less leisure time together. In a longitudinal study, Kalmijn (2005) showed that both division of labor (e.g., wife's employment) and current family life cycle stage (e.g., having children) determined the extent to which partners' sex-role attitudes converged over time: Specifically, alignment became stronger when the relational relevance of sex-role attitudes increased (e.g., after transition to parenthood). Leisure activities can be considered as complementary to work and family time budgets; hence, we expect diametrical effects. Specifically, transitions such as childbirth and entry into the labor market may create an asymmetric distribution of leisure time in the couple which, in turn, inhibits alignment processes. Conversely, alignment of leisure-related lifestyles should be facilitated after the transition into the empty nest phase or retirement, respectively (H3).

In addition to the arguments presented so far, alignment of lifestyles can be thought of as an investment in the relationship (Hill, 1988, p. 429; Kalmijn & Bernasco, 2001). Hence, adjusting one's leisure-related habits to match one's partner becomes part of the intangible ties that bind partners together, thereby creating barriers to separation. As these investments are usually lost when relationships dissolve, partners should (a) invest in partnerships characterized by a high match quality (H4) and (b) try to avoid sunk costs by refraining from "exit behaviors"; hence, not only similarity but also (further) convergence of leisure-related lifestyles over time should be associated with a lower risk of relationship dissolution (H5).

A recent study by Arránz Becker and Lois (2010) disentangled the different processes leading to lifestyle homogamy in married and cohabiting couples. Two lifestyles were distinguished on theoretical and empirical grounds (Rössel, 2008; Schulze, 1992). First, the highbrow scheme represented cultural activities deemed intellectual, for example, listening to classical music or going to public readings. Second, physically and cognitively arousing activities like going to the movies or discotheques were classified under the action scheme. Because the highbrow scheme has been shown to be positively related to education, whereas the action scheme tends to be negatively related to age (Isengard, 2005), in the Arránz Becker and Lois (2010) study, various structural variables were controlled for statistically in order to estimate the impact of lifestyles, net of social background. The analyses first suggested that homogamy of leisure-related lifestyles was promoted by alignment over time (H2), especially with respect to action-oriented activities. However, alignment clearly varied across the life course. Intermediate stages in the life course (i.e., phases of active parenting and labor force participation) tended to inhibit alignment, whereas cues indicating a high-quality match (i.e., educational homogamy and being in a long-term or in a marital relationship) promoted alignment (consistent with H3 and H4). Second, the authors presented evidence for selection effects, in that not only homogamy (supporting H1) but also (further) convergence of lifestyles (see H5) over time increased couples' resilience to relationship breakup.

Cross-References

- ▶ Cultural Goods and Services (Consumption of)
- ▶ Dating Relationships
- ▶ Free Time with Partners
- ▶ Marital Adjustment

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Lifestyle Incongruity

► Cultural Consonance and Psychological Well-Being

Lifestyle Theories of Crime and Victimization

► Victimization and Routine Activities

Lifestyle(s)

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Synonyms

Conduct of life; Ways of life

Definition

Lifestyles can be defined as behavioral patterns in the areas of leisure activities and cultural taste, a visible expression of underlying values, exhibiting certain stability throughout one's biography. The specificities of lifestyles predominantly result from social class, biographic experiences, and value orientations.

Description

The increasing variations of jobs, family and household types, pursued leisure activities, and consumption habits have caused considerable debate as to the pertinence of class and stratification models during the last decades. Even though the persistence of social inequalities is evident, occupation-based models to distinguish forms of everyday life within the population have been called into question.

The lifestyle concept has emerged in response to the development of modern societies. Ulrich Beck (1986) observed tendencies of individualization and increasing societal risk resulting from individual disentanglement of traditional bonds: growing income, better education, social security, and mobility have led to increased personal resources and individualized behavior. Class-specific social norms demanding compliance and conformity have diminished in most social positions and often completely disappeared. People are capable – but also forced – to lead an independent life. In order to find understanding, guidance, and support, people associate themselves with those pursuing similar habits, values, and goals in life. Some tend to follow role models showcased in the media or music scene, which demonstrates that individualization processes can go along with growing uniformity. New models of social integration are seen as a consequence of diminishing traditional power, security, and supporting structures.

Lifestyles emerge in two ways: first as subjective memories, habits, routines, and competences and, second, as symbols of categorizing and identifying oneself and others within society. One typically acquires, stabilizes, adjusts, and revises one's own lifestyle within one's biography. Consequently, leading a lifestyle at a certain time has implications for future behavior. Lifestyles assist creating and maintaining one's identity as alongside perceived social barriers and distinction.

It was Pierre Bourdieu who gave the main impulse to lifestyle research. In contradiction to the individualization hypothesis, he developed a theory combining class analysis, social fields, and habitus theory. His idea of "habitus" refers to the importance of social backgrounds and the development of specific attitudes and evaluative patterns. He sees habitus of an individual as being a conscious or subconscious product of living and learning conditions closely associated with social class. In his theory, society is a multidimensional space opened up and divided by the amount and structure of available capital (primarily economic and cultural) and its dynamics across generations (Bourdieu, 1984). Common grounds in class membership and social practices form a class-based "habitus" measured as distance from aspired behavioral patterns, preferences for certain subjects, habits, and forms of articulation.

This constitutes what Bourdieu calls "symbolic capital" that can entail prestige, esteem, and social inclusion – or conversely disrespect, discrimination, and exclusion. Hence, members of upper classes often see the consumption of high-cultural products (e.g., opera, classical music, reading poems) as beneficial in terms of the esteem they expect to receive, which proves the existence of status group-related motives in cultural consumption alongside culturally, unevenly distributed competences. Empirical analyses often arrive at the conclusion that individuals with a higher educational attainment develop diverse cultural preferences and can hence be associated with multiple forms of cultural consumption, while less educated individuals consume a much narrower range of cultural products (DiMaggio, 1994). Researchers in the USA and UK widely use the term "omnivores" to denote those who are high educated and

lead multifaceted, plural lifestyles (Bryson, 1997; Peterson & Kern, 1996; Warde, Wright, & Gayo-Cal, 2007).

Studies on determinants of lifestyles show that age, educational attainment, social background, and sex are the most important discriminant variables of lifestyles (Schulze, 1992; Spellerberg, 1996; Van Eijck, 2011). With regard to age, for instance, it is often found that young people often pursue very diverse leisure activities that take place at a larger distance away from home. Elderly people, on the other hand, spend more time at home or at locations in its vicinity, preferring types of cultural consumption that are associated with harmony, such as regional, sentimental movies or folk music. With regard to sex, researchers often find that women tend to focus on family and show weaker inclination to do political voluntary work, while men tend to enjoy sports, pub visits, or action movies and sport programs in their leisure time. Arts, sports, further training, and reading are mostly practiced by respondents with higher educational attainment. Low educated individuals frequently favor rather solitary activities, such as going for a walk or watching TV.

In the USA and UK, empirical studies focus on the cultural reproduction of class structures by using single variables of cultural taste and leisure activities as dependent variables and demographics, socioeconomic status (SES), and sometimes spatial factors as independent variables in multivariate models. Hence, the class-based foundation of cultural consumption remains the principal focus in the English literature (Bennett et al., 2009; Chan & Goldthorpe, 2007; Lamont, 1992). In Germany, on the contrary, lifestyles are empirically investigated by means of cluster analytical and correspondence analytical techniques.

The empirical operationalization of lifestyles usually includes leisure activities, cultural taste, and cultural participation and very rarely consumption of consumer goods such as clothes or furniture. Related concepts of social milieus are better described through values and orientations rather than behavioral patterns of individuals or groups alone.

Lifestyle research is a form of social structure analysis that seeks to explore to what extent cultural patterns of behavior reinforce privileges, e.g., educational attainment – and therefore a high standard of living as well as life opportunities. The lifestyle concept was widely applied in public health to investigate observed types of diets and alcohol and tobacco consumption as well as causes of morbidity and mortality (Abel et al., 2000; Klein, Schneider, & Löwel, 2001; Marmot & Wilkinson, 2006; Robert & House, 2001). A common finding in family sociology is that congruent lifestyles strengthen partnerships, whereas disparate lifestyles coincide with separations and distress (Arranz Becker & Lois, 2010).

Veenhoven found as early as in 1984 that there is no evidence for superiority or inferiority of a particular lifestyle (Veenhoven, 1984), but married persons, persons having reliable friends, or who are more active show above-average satisfaction levels. Modern lifestyles (diverse activities outside home, hedonistic or post-material values) are more often than average concerned about public grievances (politics, environment). People with a high leisure orientation suffer from lack of leisure opportunities, whereas insufficiencies in work life may particularly affect people with a pronounced focus on jobs. Dissatisfaction with one's lifestyle can be explained on a more general level with the discrepancy theory, which means that those who don't attain their aspired lifestyle are less satisfied. The restriction theory focuses on financial or personal deficits to conduct the preferred lifestyle, and the component theory points to dissatisfaction as a part of somebody's life.

Criteria of a good life differ among various parts of the society; a good standard of living does not always entail high levels of satisfaction. Yet it has still not been systematically researched to which extent lifestyles contribute to well-being and quality of life, which seems surprising given the current quest for new criteria of what constitutes a successful society that guarantees high levels of individual well-being (Layard et al., 2009; Helliwell, Layard & Sachs, 2012; Senn, 2009; Wilkinson & Pickett, 2009).

Comparing the explanatory power of lifestyles with social class, age, or gender, the explained variance demonstrated that lifestyles have an independent effect on individual well-being (Spellerberg, 1996). In a context of growing opportunities of self-actualization, individuals are compelled to take decisions that ensure satisfying living arrangements. Furthermore, specific areas of life may become dominant for the evaluation of life. The lifestyle concept increases the possibility to discover profiles and patterns that exist outside classic conceptualizations of class and status. Therefore, it enables researchers to develop a more nuanced segmentation of the society we live in and enhance current debates on individual well-being of quality of life.

Cross-References

- ▶ Culture
- ▶ Public Health
- ▶ Social Class
- ▶ Subjective Indicators
- ▶ Sustainable Lifestyles

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Lifetime Modeling

- ▶ Event History Analysis

Lifetime Risk of Maternal Death

► Maternal Mortality in South Africa

Light and Quality of Life

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Synonyms

Daylight; Electric light; Indoor lighting; Lighting

Definition

Light is essential to the very existence of life, although much of the time we take it for granted. On a day-to-day basis, light impacts quality of life significantly and through different pathways. Light is often used as a means to create atmospheres and can powerfully influence mood and emotion. Moreover, light impacts alertness, vitality, and performance; entrains our biological clock; regulates sleep and hormonal processes; and is a crucial determinant of both physical and mental health. The design of environments that maintain and foster human well-being thus requires careful consideration of both visual and nonvisual pathways through which indoor light – both natural and artificial – impacts quality of life for its inhabitants.

Description

Intuitions about the beneficial effects of light – especially sunlight – date back at least to the ancient Greek, but many will regard Florence Nightingale as one of the first to explicitly recognize the importance of light in health care environments. In her "Notes on Nursing: What It Is and What It Is Not," she argues that light is essential to health and recovery: *It is the unqualified result of all my experience with the sick that, second only to their need of fresh air, is their need of light; that, after a close room, what hurts them most is a dark room and that it is not only light but direct sunlight they want*- Florence Nightingale, 1860, p.47

Although Nightingale's ideas on the salutogenic effects of light were largely based on unstructured observations at the time, her insights have indeed been confirmed by a number of controlled studies performed in clinical settings. In these studies, direct sunlight entering the room – particularly in the morning – proved effective in decreasing the length of stay for depressed patients in psychiatric units (Beauchemin & Hays, 1996; Benedetti, Colombo, Barbini, Campori, & Smeraldi, 2001). Similarly, spinal surgery patients reported lower levels of experienced ► pain and ► stress in more sunny hospital rooms (Walch et al., 2005). Moreover, patients treated for a myocardial infarction showed faster recovery and lower ► mortality in more sunny rooms (Beauchemin & Hays, 1998, in a manuscript aptly titled "dying in the dark"). These studies demonstrate that sunlight is conducive to recovery from both mental and physical health problems.

Electric light has also demonstrated therapeutic effects in clinical settings. Its best-known application is in the treatment of Seasonal Affective Disorder (SAD, or "winter depression"). Based on a review and meta-analysis of randomized controlled trials, Golden et al., (2005) conclude that bright light treatment and dawn simulation are effective for persons suffering from SAD. The effect sizes were equivalent to those in most antidepressant pharmacotherapy trials, and effects appeared relatively fast and with minimal adverse side effects. But application of bright light also shows promise for the treatment of nonseasonal mood disorders (Terman & Terman, 2005). Its effectiveness in this domain has been established in a very recent

study on elderly patients with major depressive disorder (Lieverse et al., 2011), which demonstrated that bright light therapy improved mood and enhanced sleep efficiency.

Importantly, the effects of light – natural or electric – on well-being extend beyond clinical settings and pertain also to the healthy population. For instance, Partonen and Lönnqvist (2000) explored the effects of exposure to bright light on office employees during a field study in winter. Repeated bright light exposure improved vitality and alleviated distress both for those with and without season-dependent symptoms. Hubalek, Brink, and Schierz (2010) demonstrated that daily light exposure was positively and significantly related to sleep quality in a healthy population of office workers. Exposure to bright light can impact ▶ mood, increase subjective alertness, improve cognitive task performance, and influence physiological measures of arousal. A higher illuminance can, for instance, affect hormone secretion, increase heart rate and heart rate variability, and increase core body temperature (e.g., see Cajochen, 2007). Such effects have been demonstrated for nocturnal exposure to light but have recently also been established during the day, under regular conditions, i.e., in persons who had not been sleep or light deprived before the light exposure (Smolders, de Kort & Cluitmans, 2012).

Although far from comprehensive, the literature discussed above clearly illustrates the powerful impact light has on subjective and objective mental and physical well-being. Its effects range from improved mood, vitality, alertness, stress relief, and sleep quality to recovery from depression and recovery after surgery. In order to employ natural and artificial lighting to optimize human functioning, and to formulate crucial requirements for human light exposure – e.g., dose, timing, spectrum, source – we need to fully understand the mechanisms through which this external stimulus gets under our skin.

Pathways of Light to Human Well-Being

Different mechanisms underlie light's impact on human health and well-being. The first category of mechanisms is referred to as the visual path. Importantly, this visual path not only pertains to visual performance in terms of, for instance, object recognition, contrast perception, or visual comfort. It also refers to phenomena that are more experiential in nature, e.g., relating to the strong preferences individuals show toward (brighter) daylight and the positive connotations they have with natural light and sun (e.g., Galasiu & Veitch, 2006). From a theoretical viewpoint, it is important to note that preferences that exist for environments with windows are naturally confounded with preferences for a view to the outside, providing among other things information on weather, season, time of day, social activity, and positive distraction. Yet recent research showed a consistent preference for brighter and sunnier views, even when controlling for the content of images (Beute & de Kort, 2012). As such, sunlight and daylight can improve satisfaction, improve mood, and induce positive emotions. In turn, mood and emotion, as core elements of ▶ subjective well-being, have been related to health in the domain of ▶ positive psychology. In addition to daylight, the literature indicates that artificial lighting can also influence emotions, mood, ambiance, aesthetic appreciation, and spatial impressions, although at this time the collected findings are quite inconclusive and have only rarely been established outside of the laboratory. Nevertheless, light is one of the core elements people use to create an ambiance, for instance, at home, in retail or hospitality settings, and beneficial effects are even reported for work environments (e.g., Kuller, Ballal, Laike, Mikellides, & Tonello, 2006).

The strong preference for daylight in workplaces is said to be associated particularly with the belief that daylight supports better health (Galasiu & Veitch, 2006). To illustrate this point, studies assessing beliefs about lighting effects found that over eighty percent of their participants agreed or strongly agreed that natural light indoors improved their mood. A majority also reported that the quality of light was important to their well-being. People may also hold beliefs regarding the positive effects of bright or natural light on alertness and performance.

Beliefs may have been fed partially by recent publications on such effects in the popular media, but in fact, such beliefs have existed well before these studies had even been performed (Galasiu & Veitch, 2006). As a supplementary psychological route in addition to preferences, positive mood, and satisfaction, associations between alerting effects and bright and natural light may unconsciously influence motivation for and/or effort invested in the task at hand.

A second important category of pathways for light's effects on health pertains to so-called nonvisual (or non-image forming) mechanisms. Since long, light has been related to the circadian system and acknowledged as one of the important "Zeitgebers" entraining the biological clock to natural rhythms of day and night. Until recently, it was generally assumed that this effect was initiated by the same rods and cones that help us see the world in all its colorful splendor. This view has been radically changed by the discovery of the intrinsically photosensitive Retinal Ganglion Cell (ipRGC; Berson, Dunn, & Takao, 2002; Sekaran, Foster, Lucas, & Hankins, 2003). This third type of photoreceptor cell in the mammalian retina does not signal to the visual cortex and hence does not contribute to vision as far as we know. Instead, it projects directly to the suprachiasmatic nuclei (SCN), our internal biological clock, and from there on influences the production of certain hormones (e.g., melatonin, cortisol) and activates numerous parts of the brain relevant to alertness. This discovery has contributed to a much deeper understanding of the neural mechanisms behind the biological clock, and spurred a significant research effort in this area. Through this research we have come to learn that this non-image forming photoreceptor is particularly sensitive to light in the short-wavelength, blue part of the spectrum – not accidentally abundantly present in daylight. Recent research has established that via this nonvisual route, light can have both direct and phase shifting effects on the circadian clock.

Phase shift effects refer to temporal changes in the circadian rhythm. Good entrainment of the biological clock is essential for good sleep and good mental and physical health. Periodic light – preferably bright and with high power in the blue part of the spectrum – is necessary for effective and stable entrainment of our biological clock. A misalignment between the internal circadian pacemaker and the external environment has been related to problems such as cardiovascular disease, diabetes, sleep disorders, gastrointestinal disorders, and possibly cancer (Cajochen, 2007). Although the exact physiological workings behind these effects are not fully understood, much may be traced back to the importance of good sleep and the well-timed production of hormones and other bodily processes in alignment with the daily pattern of sleeping, eating, physical activity, and other behaviors. Nocturnal exposure to light (including late evening and early morning) can reset the internal clock – forward or backward depending on the exact timing of the exposure. This may result in the desynchronization of physiological and hormonal processes with a person's activity patterns (e.g., Cajochen, 2007). Bright light, administered at the right time of the day, can realign the internal clock to function in concordance with daily rhythms and as such support health. These insights are particularly useful in the treatment of sleep and mood disorders. They also aid in supporting shift workers and other individuals who may be subject to deregulated circadian rhythms, e.g., during intercontinental travel (jet lag), during seasons with extremely long or short durations of natural daylight, or due to degenerative impairments of the visual system (e.g., yellowing of the lens, glaucoma).

Direct effects of light on the human nervous system refer to instantaneous changes in physiological arousal demonstrated in for instance heart rate and heart rate variability, brain activity measured with EEG and fMRI, and hormone secretion (melatonin, cortisol). In addition to these psychophysiological effects, research has shown that exposure to higher illuminance levels can result in increased subjective alertness. Studies have demonstrated that bright light at night counteracts sleep pressure and immediately raises alertness, performance on mental tasks, and the ability to sustain attention. But immediate effects of light have also been demonstrated during daytime, i.e., when hormonal levels of melatonin

and cortisol already support wakefulness and sleep pressure is low (Smolders, de Kort & Cluitmans, 2012).

Reconsidering Indoor Lighting for Quality of Life

The discovery of the intrinsically photosensitive Retinal Ganglion Cell (ipRGC) has incited a significant research effort to untangle the exact workings of this new pathway of light into the brain. Simultaneously, it has raised our awareness of the importance of light, and particularly of using daylight for the realization of healthy environments. By nature, daylight is intense, powerful in the shortwave (blue) part of the spectrum, and maximally supports the circadian rhythm through its availability during the day and absence during the night. Architectural lighting strategies, which traditionally involved mainly the consideration of energetic issues and of visual aspects of lighting – aesthetics, visual performance, and comfort – should now also explicitly incorporate the nonvisual effects of light in the design of the built environment. This holds particularly for those environments where people spend considerable amounts of time – at home, at work, in schools, and in care settings (e.g., hospitals, residential care facilities) – and for user groups that spend little time outside.

As we have seen, artificial light also contributes to lighting quality. Indoor light standards currently do not take into account requirements pertaining to the circadian properties or the acute alerting and performance enhancing effects of light. Such requirements relate to lighting spectrum, color temperature, and lighting levels – generally levels of around 1,000 lux are advised for entrainment of the biological clock, at least a few hours a day. Moreover, the direction of lighting should be considered, as vertical – i.e., directly on the eye – rather than horizontal – i.e., on the table or desk – illuminance levels indicate the actual amount of light falling on the retina. In the majority of current offices the lighting does not satisfy these nonvisual lighting criteria. A large study by Aries (2005) found that in only 20 % of offices illuminances over 1,000 lux at the eye were attained; illuminance levels were correlated with employees' sleep quality (positively) and fatigue (negatively). Therefore, in addition to requirements pertaining to visual performance, comfort and aesthetics, lighting levels, and light spectrum should be considered with regard to vital biological mechanisms, supporting the healthy entrainment of employees' biological clocks and optimal alertness, vitality, and performance. Moreover, light designs should respect the psychological needs of workers. Preferences for windows and daylight have been well established in work environments (Boyce, Hunter, & Howlett, 2003), and lighting characteristics have been shown to improve satisfaction and mood at work (Veitch, Newsham, Boyce, & Jones, 2008). Special care needs to be given to the specification of lighting systems for shift workers, helping them to stay awake and alert for safe and optimal performance, yet preventing a misalignment between their internal clock and their activity patterns on subsequent days (Cajochen, 2007).

Evidence of daylight effects on learning, student performance, and well-being are quite scarce. For a large part, this is due to the extensive set of parameters that vary between schools (e.g., air quality, noise, the specific school and school site, teacher skills, school socioeconomic status) and have been difficult to control even in large-scale investigations. Yet although daylight brings some risks of glare and heat gain, windows that provide sufficient and evenly distributed daylight, and extensive views to the outside (particularly nature) are likely to make a positive contribution to student progress (Boyce, 2004). Studies exploring the effects of artificial lighting in schools are even scarcer. A recent pilot study on effectiveness of variable lighting reported that high intensities and color temperatures may improve reading speed and concentration (Barkmann, Wessolowski, & Schulte-Markwort, 2012). Moreover, the same manuscript suggests that the opportunity to structure the school day by selecting different light settings to accommodate the type of activities – e.g., intense blue light for concentration, lower and warmer light levels for interaction and group work – is generally appreciated by both teachers and students.

Similar applications will need to be investigated on a larger scale. But as in professional contexts, light and windows are expected to enhance mood, alertness, vitality and performance, improve sleep quality, and lower stress and anxiety.

Striking findings in terms of light's effects in care environments were already mentioned in the introduction. They included improved mood and enhanced sleep efficiency, recovery from both seasonal and nonseasonal depression, faster recovery after surgery, decreased use of pain medication, and even lower mortality rates. Effects were reported for daylight, sunlight, and/or artificial lighting. Importantly, they often did not uncover the underlying mechanisms: some effects may have been grounded in visual pathways, others in nonvisual pathways, others perhaps in both. But because the inhabitants of these places are either sick, recovering, or frail, and oftentimes stay there for extended periods of time, care environments present the most pressing case for good lighting. Moreover, an integrative review of studies relating to "healing environments" concluded that the only environmental characteristics for which convincing evidence had been delivered for a psychological effect on well-being in care settings were sunlight, windows, and odor (Dijkstra, Pieterse, & Pruyn, 2006). Care environments are also the setting for innovative and exciting explorations of new light applications: for instance, bright light for circadian entrainment of dementia patients in residential care, dynamic lighting for de-escalation and the prevention of segregation in psychiatric care, daylight simulation and artificial skylights for relaxation, stress relief, and better recovery in hospitals.

In a recent brief review centering on home environments, Veitch (2011) concludes that only scant attention has been given to effects of light in residential buildings, in spite of the growing literature on the relevance of light for human health. Again, as for work and school environments, lighting quality in housing should pertain to visual, biological, and psychological mechanisms and particularly consider sufficient levels of daylight, for regular and consistent provision of sufficient levels of natural light, meeting both circadian needs and user preferences. Special attention should be given to lighting design for the elderly. Changes in the ageing visual system render them more sensitive to glare, while at the same time requiring higher lighting levels both for visual performance and entrainment of their biological clock. In conclusion, light impacts quality of life significantly and through different pathways. Although the psychological and biological pathways that mediate the relation between light and quality of life have been subject of much research during the past decade, they deserve much more scientific attention in the future. At the same time, the evidence collected to date sufficiently warrants the claim that the design of environments that maintain and foster human well-being requires the careful consideration of both visual and nonvisual pathways through which indoor light – both natural and artificial – impacts quality of life for its inhabitants. In short, there is great potential in leveraging the quality of light to enhance the quality of life.

Cross-References

- Built Environment
- Mood
- Morningness, Eveningness, and Life Satisfaction
- Mortality Rates
- Nature and Well-Being
- Outdoor Environment
- Pain
- Positive Psychology
- Psychophysiological Measures
- Restorative Natural Environments
- Salutogenesis
- School Climate
- Sleep, an Overview
- Stress
- Subjective Well-Being

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Lighting

▶ Light and Quality of Life

Likert Scale

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Definition

Rather than asking respondents simply whether they agree or accept an opinion statement, Likert scale items asked how strongly they agree or

disagree with it, usually on a 5- or 7-point scale from 1 (= strongly agree) to 5 or 7 (= strongly disagree), with 3 being a neutral feeling or category.

Description

Likert scales have probably become the most popular attitude scale format for measuring public opinion on any issue. (It is an attitude scale, then, and is not appropriate for measuring behaviors, as it is often mistakenly claimed, in terms of frequency scales running from doing an activity "quite often" to "sometimes" to "never.")

While having the value of measuring degree or strength of one's opinion, Likert scale items still are subject to the important and pervasive measurement liability of "agreement response set," which is the tendency for survey respondents to agree with any statement in order to appear positive or agreeable. Survey methodologists (e.g., Krosnick, 1999; Schuman & Presser, 1981) therefore recommend asking opinion statements in "balanced alternative" or "forced choice" format (e.g., "Are you more liberal or more conservative, or don't you think of yourself as one or the other? Are you more pro-life or more pro-choice, or don't you think of yourself as one or the other?").

Cross-References

- ▶ Response Format
- ▶ Survey Research

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Limit

- ▶ Design, an Overview

Linear Regression Model

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Description

Regression involves the estimation of the value of a variable from that of one or more other variables, with the relevant coefficients derived from empirical observations.

Although no causal link may be intended, the variables are usually identified as the dependent and the independents, respectively, with the implication that the purpose of the analysis is to estimate the value of the former from those of the latter. The dependent is usually denoted as the y variable and the independent variables as the x variables – i.e., $x_1, x_2 \ldots x_n$. A regression equation identifies the relationship between the variables, of the form:

$$y = a + b_1x_1 + b_2x_2 \ldots b_nx_n +/- se_y$$

where

a is the constant term – the value of y when the values of all of the x variables are set at 0;

$b_1 \ldots b_n$ are the regression or slope coefficients, indicating the change in the value of y for each unit of change in the relevant x value; and

se_y is the standard error of the estimated y values.

Also associated with the regression equation is a goodness-of-fit measure – R – the multiple correlation coefficient. This varies between 0 and 1.0: The closer it is to 1.0, the better the fit. (In certain situations, where the value of R is adjusted for the number of observations relative to the number of variables – the degrees of freedom – it may take a negative value).

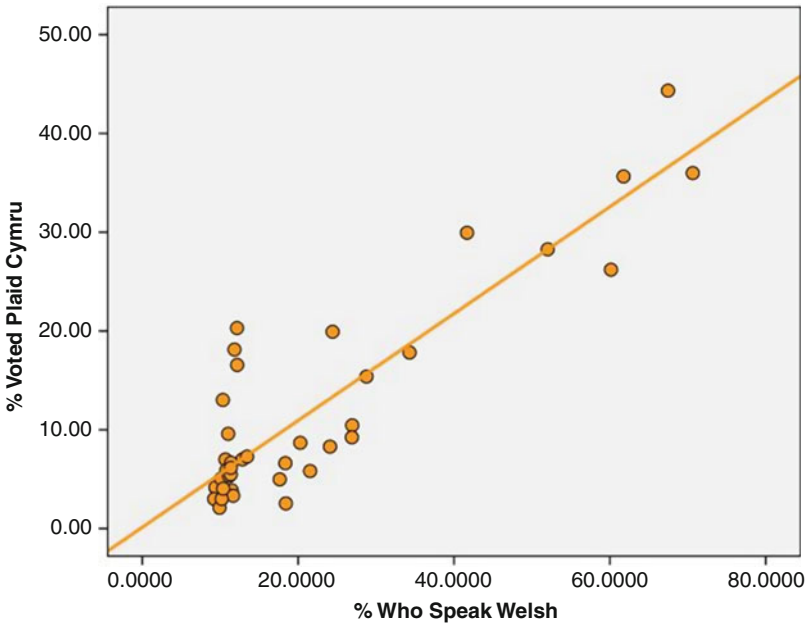
There are two main types of linear regression: In bivariate linear regression, there is just one x variable; in multiple regression analysis, there are two or more x variables. In multiple regression, each separate relationship is independent of the others – sometimes expressed as ceteris paribus (all other things being equal); it is the relationship between that x variable and the y variable, holding constant the relationships between y and the remaining xs plus those among all pairs of the x variables.

Regression analysis provides an estimate of the value of y by solving the basic equation for any given value of $x_1 \ldots x_n$. If there is a perfect fit – i.e., a correlation of 1.0 – then all of the estimated values fall on the regression plane (in bivariate regression, that plane is a single line; in multivariate regression, it is an n-dimensional plane). The frequency distribution of the residual values – the differences between the estimated value for each of the observation points used to fit the regression model and the actual value – will have a mean of 0.0 (i.e., the positive deviations – above the regression line in the bivariate case – and the negative deviations – below the line – should balance out). The standard deviation of that distribution of residuals is known as the standard error of the y variable.

Linear regression analysis makes a number of assumptions about the data used in fitting the equations. The relationships between the x and y variables should be linear (i.e., have a straight line relationship); the frequency distribution of the residuals should be normal; the mean of the residuals should be zero; the variance of the residuals should be homoscedastic (i.e., have a normal frequency distribution around every estimated value of y); and there should be no autocorrelation (all of the values of each x and y variable should be independent of all of the other variables). Few datasets – especially most of those employed in social science – meet all of these requirements exactly and some deviation from the norm is usually acceptable, although tests should be applied to ensure that the deviation does not bias the estimates and, especially, the standard errors – which may mean that a relationship is accepted as true when it is not.

In most regression analyses, tests of statistical significance are applied. These were developed for making inferences from an analysis of a sample of observations to the population from which that sample was drawn. These tests assume that there is a frequency distribution for each coefficient which represents all the possible outcomes; if the observed coefficient would only occur rarely in a random sampling of observations – usually in only one-sample-in-twenty (known as the 0.05 significance test) – then it is concluded that the observed relationship in the sample would probably be observed if data were available for the entire population. (For example, if you find in a random sample of 2000 London residents aged 20–60 that for every 10 years increase in their age, their annual income increases on average by £5,000, and the b coefficient is statistically significant, you can be confident that relationship applies to the entire population from which the sample was drawn). These same tests are commonly also applied where the data analyzed cover the entire population – on the grounds that the observed pattern is just one of a large number of regressions that would be possible with that data set if the values of y and x were allocated randomly across the observation points.

Whether an individual coefficient is statistically significant is usually assessed using a t-test. The t-statistic is calculated as the coefficient divided by its standard error: If its value exceeds +/– 1.96, then the coefficient is considered statistically significant at the 0.05 level because such a value would occur less than once-in-every-twenty random samples. A crucial influence on the statistical significance of a coefficient is the size of the sample.



Linear Regression Model, Graph 1 Relationship between the percentage who speak Welsh and the percentage who voted for Plaid Cymru at the 2010 UK general election

With large data sets, such as the social surveys analyzed in much social science, many coefficients may be registered as statistically significant, but their impact on the dependent variable may be small. In such cases, whether an independent variable is significantly linked to the dependent is less important than its substantive impact – when all other variables are held constant, do changes in one independent variable lead to substantial changes in the dependent (a question which leads some to doubt the value of significance testing: Ziliak and McCloskey, 2008).

A multiple regression example extends that used in the entry on bivariate regression. Graph 1 shows the relationship between the percentage of the population in each constituency in Wales who speak Welsh (x) and the percentage who voted for Plaid Cymru (The Party of Wales – y) at the 2010 UK general election. There is a clear positive relationship, with the regression having the form:

$$y = 0.132 + 0.541x +/- 4.989$$

$$(1.27)\ \ (0.046)\ r = 0.887\ r^2 = 0.787$$

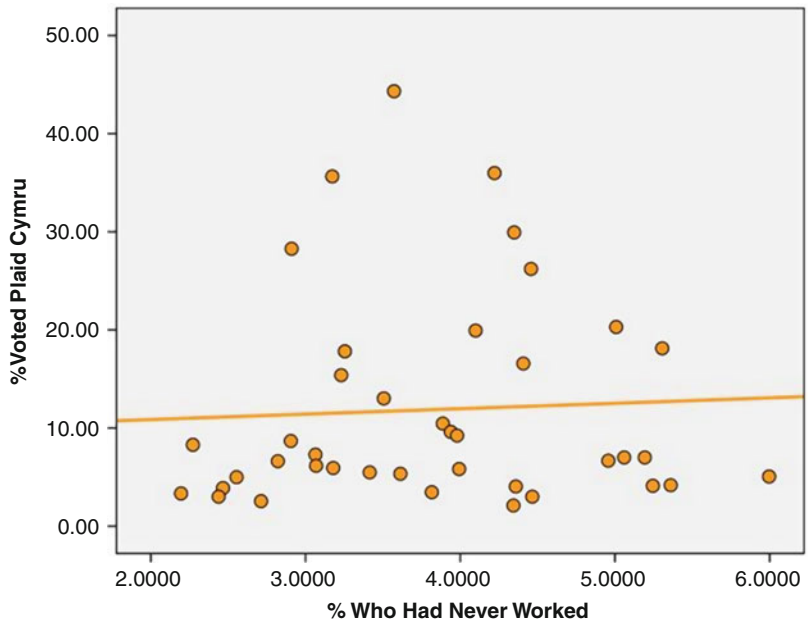
The standard error for each coefficient is given in brackets, so the t-value for the x coefficient is 11.76. That for the a coefficient (0.132/1.27) is insignificant at 0.10, indicating that you cannot infer that it (i.e., the value for y when $x = 0$) is significantly different from 0.0.

Graph 2 shows a second relationship, between voting for Plaid Cymru (y) and the percentage of the workforce who had never worked (x). This is much weaker, with the regression having the form:

$$y = 9.759 + 0.552x +/- 10.769$$

$$(6.968)\ \ (1.769)\ r = 0.051\ r^2 = 0.003$$

In this case, the regression coefficient is clearly statistically insignificant – a t-value of just 0.31 (0.552/1.769) – and the correlation coefficient indicates that very little of the variation in y can be associated with x. However, it may be that if the percentage who speak Welsh is held constant, then adding the percentage who have never worked in a multiple regression analysis increases the statistical explanation. There is virtually no relationship between the two



Linear Regression Model, Graph 2 Relationship between the percentage who had never worked and the percentage who voted for Plaid Cymru at the 2010 UK general election

independent variables, as shown in Graph 3 (the r^2 value when regressing the 2 is 0.10), so both are included in the following multiple regression equation:

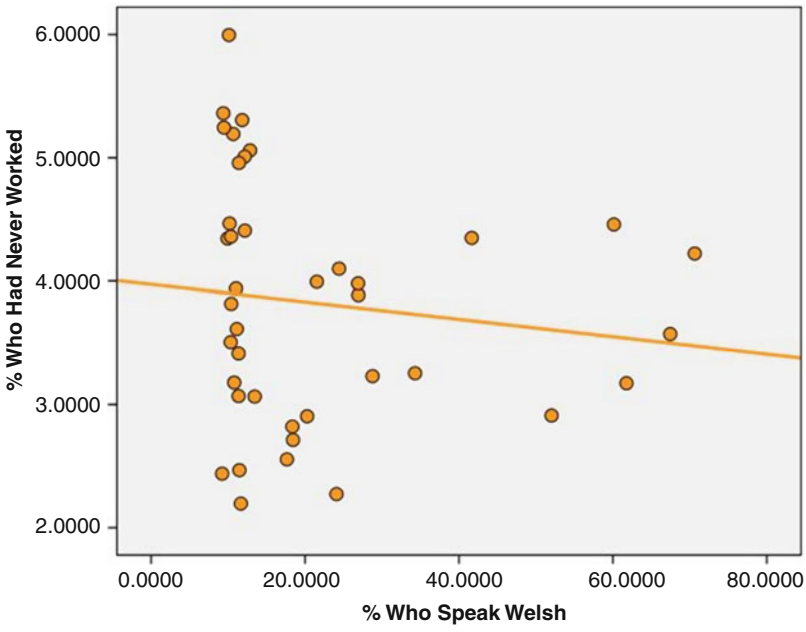
$$y = -7.013 + 0.554x_1 + 1.799x_2 +/- 4.730$$

$$(3.335)(0.044)(0.783)\, r = 0.901\, r^2 = 0.813$$

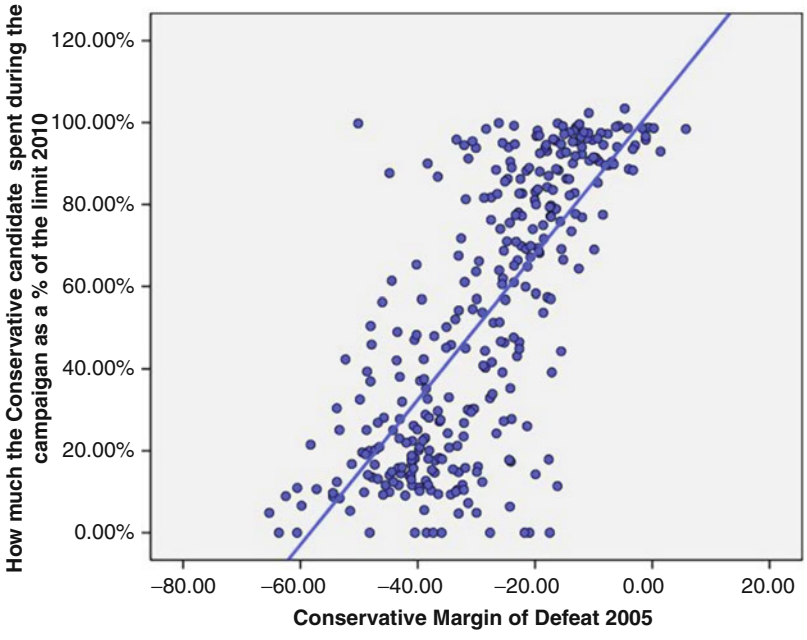
Both of the independent variables are significantly related to y: the t-value for x_1 (percentage who speak Welsh) is 12.648, and that for x_2 (percentage who have never worked) is 2.297. The larger the numbers of Welsh-speakers and of long-term unemployed in a constituency, the greater is the percentage who voted for Plaid Cymru.

One further statistic often used in multiple regression analyses is the partial regression coefficient. Because the independent variables may be differently scaled, comparison of their regression coefficients may not be straightforward: The percentage speaking Welsh varied between 9.2 and 70.6, for example, whereas the range for those who had never worked was 2.20–6.00. The partial regression coefficient (or beta weight, β) is obtained by multiplying the regression coefficient by the ratio of the standard deviation of the dependent variable to that of the independent variable. In our example, the beta weights for x_1 and x_2 are 0.907 and 0.165, respectively, indicating that x_1 has 5.5 times more impact on y than does x_2. The goodness-of-fit for a partial regression coefficient can also be indexed by a partial correlation coefficient (thus, $r_{y1.2}$ indicates the correlation between y and x_1 holding x_2 constant).

Although linear regression analysis assumes a linear relationship between the dependent and independent variables, many real-life relationships are nonlinear. Graph 4 shows one such: the relationship between the margin of defeat for Conservative candidates in seats where they lost at the 2005 UK general election in constituencies and the amount they spent on the campaign there in the next (2010) election as a percentage of the maximum allowed. A regression line has been fitted, but it is clear that the distribution of residuals does not meet the linearity criterion: in the upper part of the graph, most of the observations are above the regression line, whereas in the lower part, most



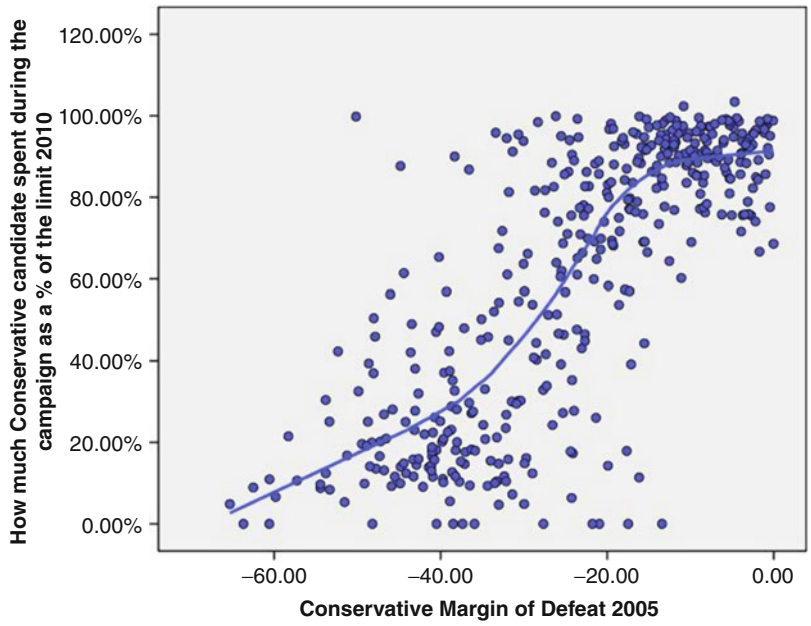
Linear Regression Model, Graph 3 Relationship between the percentage who speak Welsh and the percentage who had never worked



Linear Regression Model, Graph 4 Relationship between the Conservative party's margin of defeat at the 2005 UK general election, by constituency, and th eamount that the party spent (as a percentage of the allowed maximum) there at the 2010 general election

are below it. The correct relationship would appear to be S-shaped, as shown in Graph 5.

Many nonlinear relationships can be "linearized" by transforming one or both of the variables. For that in Graph 5, for example, the dependent variable is constrained to values between 0 and 100 (spending either nothing or the maximum allowed in the constituency). That can be linearized using a logit transformation giving the linear relationship in Graph 6:



Linear Regression Model, Graph 5 The same relationship as in Graph 4 but with a logit regression fitted

$$\text{Logit}\, y = \text{Ln}[y/(100 - y)]$$

which has a range between +/– infinity.

Fitting a regression with a logit transformation gives:

$$y = 3.145 + 0.097x +/- 1.332$$

$$(0.124)\quad (0.004)\, r = 0.741\, r^2 = 0.550$$

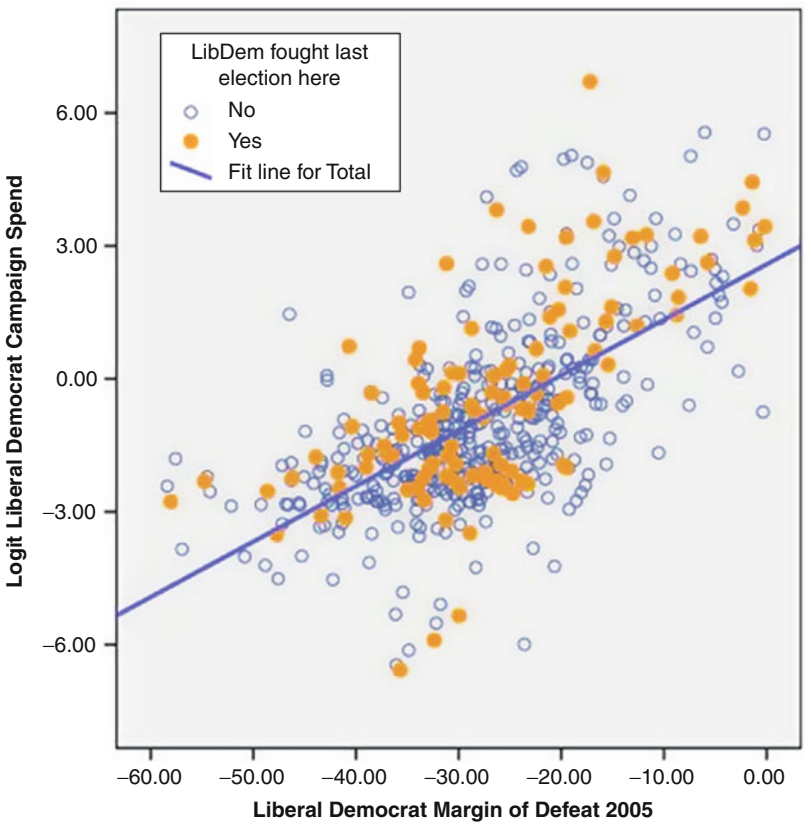
In multiple regression analyses, it is also possible to include nominal independent variables, usually termed dummy variables. Graph 6 shows a similar relationship to that in Graph 5, but for the Liberal Democratic party. In it, the observations (constituencies) are separately categorized according to whether the Liberal Democrats fielded the same candidate in 2010 as in 2005. Did they spend more where they were fielding the same candidate? To test for this, we create a dummy variable (x_2) whereby a constituency is coded 0 if the Liberal Democrats were not fielding the same candidate and 1 if they were. The coefficient for x_2 can then be interpreted as the average difference between the amount spent where the Liberal Democrats had a new candidate and that spent where they fielded the same one, holding margin of defeat constant. The equation is:

$$y = 81.6622 + 1.844x_1 + 7.688x_2 +/- 23.56$$

$$(2.877)(0.093)(2.401)\, r = 0.647\, r^2 = 0.416$$

Both of the independent variables are statistically significant (the t-values are 19.790 and 3.202, respectively); the b coefficient for x_2 indicates that on average a candidate who had contested the previous election spent 7.688 % more of the allowed total than did first-time candidates. The two partials (β values) of 0.634 and 0.103, respectively, indicate that x_1 (margin of defeat) makes a much larger contribution to the estimates of y than x_2 (whether they fielded the same candidate).

A wide range of variable types can be included in different forms of multivariate linear regression analysis. For example, a dummy variable can be used as the dependent variable (termed binary logistic regression) to compare two outcomes, and multiple dummy variables (three or more



Linear Regression Model, Graph 6 The relationship between the Liberal Democrat margin of defeta at the 2005 UK general election, by constituency, the amount that the party spent (as a percentage of the allowed maximum) there at the 2010 general election and whether the party's 2010 candidate also fought the 2005 election there

possible outcomes) in multinomial logistic regression. Ordered dependent variables can also be analyzed - as in ordered probit analysis. All of these, and numerous others, are members of the family of generalized linear models (McCullagh & Nelder, 1989).

Cross-References

► Robust Statistical Tests

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Linear Scale Transformation

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Synonyms

Direct rescaling (of the scale ratings); Direct stretching (of the rating scale)

Definition

Linear scale transformation is one of the rescaling methods of the ratings of *k*-step primary rating scales to make comparable the results

obtained by using primary scales with different numbers (k) of ratings.

This is achieved by assigning the most unhappy response option the value "0" and the most happy situation the value "10" on a common secondary rating scale. The other $k-2$ ratings are positioned in between in such a way that all $k-1$ distances between successive ratings are equal and have the value $10/(k-1)$.

Description

Different Rating Scales

Quality of life (QoL) is often assessed in surveys, where respondents are requested to answer single questions by choosing one of several response options. For example, a common question about self-perceived quality of life is:

"Taking all things together, how would you say things are these days – would you say you are . . . ?" with four possible response options {"very happy," "pretty happy," "not too happy," "unhappy"}.

One of the problems in this research area is that different researchers often used different response scales for questions on the same subject matter, one of these differences being the number of response options provided; next to the above four-step question, there are questions with 2–12 response options. This greatly reduces the comparability of the available research findings, and since comparison is crucial in QoL research, this calls for methods to present results on a common scale of at least the same length. One such technique is ▶ rescaling, of which *linear scale transformation* is a variant.

A second problem is that many rating scales have verbal response options. The application of arithmetical operations, such as addition and multiplication, requires the conversion of texts as "pretty happy" into a number in order to enable the calculation of statistics such as the average happiness value of the sample.

Linear scale transformation is one of the methods used to perform the rescaling of discrete measurement scales to make the results that have been obtained using verbal scales with different numbers of response options comparable.

Rescaling the Primary Scale of Measurement

This operation requires a *rescaling of the ratings* of the original or primary scale of measurement, which is carried out in two or three steps.

On the primary scale, happiness is always measured at the ordinal level of measurement. First the verbal responses and code ciphers must be transformed into numbers; this two-step process is called "*cardinalization*." In the third step, one transforms these numbers into the ratings of a secondary scale with standard limits 0 for the least happy response option and 10 for the most happy one.

Cardinalization

Traditionally, the replacement of text or pictures with numbers is made in two steps.

Step 1: This step applies to nonnumerical scales only. Code the text or picture by replacing the labels/smileys with ciphers. These code ciphers are obtained by replacing each label/smiley with its rank order in the ordered list of response categories, starting with the least happy option. So in the above example, one starts with "unhappy" → "1," and the second option "pretty happy" is coded with its rank "3."

Step 2: Replace this code, say "3," with the corresponding cardinal number 3 (=3.00). In this way the ordinal rating scale is replaced with a metric one, where the application of arithmetical operations, such as addition and multiplication, is admissible. At the same time, equidistance between successive ratings is introduced automatically. This second step applies to both nonnumerical and numerical scales.

Many authors confine themselves to the cardinalization step only and calculate sample mean values and standard deviations in the classical way on the basis of these ratings {4, 3, 2, 1} in the above example and report these as such. We will denote these statistics in this context as m_1 and s_1, respectively.

Linear Transformation to a Common Secondary Scale

The third step in this rescaling process is realized in a *linear transformation* of all the ratings in such a way that both terminal ratings are transformed into the values 0 for the least and 10 for the most happy response option, respectively. The other $k-2$ ratings are positioned in between at equal distances between the successive ratings. This proportionally stretching procedure is also known as "*direct stretching*" or "*direct rescaling*."

In the case happiness is measured using an 11-step numerical scale (0–10), this third step can be skipped, since the secondary scale is identical to the primary one.

This transformation is called "linear" because each primary rating after cardinalization r_1 is transformed into its secondary image $r_2 = c_0 + c_1 r_1$ with constants $c_1 = 10/(k-1)$ and $c_0 = -c_1$ respectively.

Because this scale transformation is linear, the values of the average value m_1 and of the standard deviation s_1 as defined above can be transformed into the corresponding values on the secondary scale, denoted m_2 and s_2, respectively. This transformation is also linear. General formulae for these statistics in the case of any linear transformation can be found in (Kalmijn, 2010). Their application to the present situation results in the formulae,

$m_1 \rightarrow m_2 = [10/(k-1)].(m_1 - 1)$ and

$s_1 \rightarrow s_2 = [10/(k-1)].s_1$, respectively

In Table 1 this procedure is represented schematically for the case $k = 4$.

Poor Validity

Rescaling by linear transformation is a solution only for the problem of unequal numbers of response options of an ordinal scale of measurement. The labels of the verbal response options are discarded, and, as a consequence, all other problems due to the use of different primary scales are fully ignored. Therefore, its validity is quite poor from a methodological point of view.

Superior alternatives are available; in particular the one on the basis of the continuous ▶ latent happiness variable offers a much more valid solution. This method is described in the ▶ Happiness Population Distribution Parameter Estimates lemma.

Cross-References

- ▶ Happiness Population Distribution Parameter Estimates
- ▶ Latent Happiness Variable
- ▶ Rescaling

References

Kalmijn, W. M. (2010). *Quantification of happiness inequality*. PhD dissertation Erasmus University Rotterdam (NL), pp 186–188. Available at http://repub.eur.nl/resource/pub_21777/index.html

Linear Scale Transformation, Table 1 Re-scaling of a four-step verbal scale by linear transformation (secondary ratings in the right-hand column)

		Stretching	
Response category	Code (rank) rating	Before	After
"Very happy"	"4"	4.00	10.00
"Pretty happy"	"3"	3.00	6.67
"Not too happy"	"2"	2.00	3.33
"Unhappy"	"1"	1.00	0.00
Statistics:	Average value m_1 Standard deviation s_1	$m_2 = 3.33\ m_1 - 3.33$ $s_2 = 3.33\ s_1$	

LISREL

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Definition

LISREL is an acronym derived from LInear Structural RELations. The term is used to refer either to structural equation modeling or to Jöreskog and Sörbom's statistical computer software program used to test such models (Jöreskog & Sörbom, 1996a; Jöreskog, Sörbom, du Toit, & du Toi, 2000).

Description

The first use of the term refers to structural equation models, given that these models are special cases of the so-called general linear structural relationships model. The LISREL model consists of two parts: the measurement model and the structural equation model. The former specifies how latent (unobserved) variables or hypothetical constructs depend upon or are indicated by the observed variables. This model allows estimation of the ▶ reliability and validity of the observed variables. The structural equation model specifies the relationships between the ▶ latent variables. Thus, in the LISREL model, the linear structural relationships and the factor structure are combined into one comprehensive model. Extensions of the original LISREL model allow matrices of polychoric correlations among variables to be analyzed, where ordinal variables are considered as crude measurements of underlying unobservable continuous variables having bivariate normal distributions. Other extensions allow nonlinear constraints to be imposed on LISREL parameters (e.g., on the elements of the covariance matrix of measurement errors in predictors). The LISREL model permits more sophisticated hypotheses derived from theory to be tested.

The second use of the term LISREL refers to the statistical software program. LISREL is one of the first widely available computer programs developed by Swedish statisticians Karl Jöreskog and Dag Sörbom in the 1970s and subsequently updated by them. The LISREL program has been designed to accommodate models that include measurement errors in both dependent and independent variables, correlated measurement errors, multiple indicators of latent variables, interdependence, reciprocal causation, and feedback loops among variables. It uses methods to conduct exploratory and confirmatory factor analysis, higher-order factor analysis, ▶ multiple regression analysis, path analysis, repeated measures analysis, incomplete data analysis, multigroup analysis, and multilevel analysis. The LISREL program is mainly syntax-based. The LISREL command file consists of several command lines, used to specify characteristics of the data set (e.g., number and names of input variables, type of matrix to be analyzed), characteristics of the model used for the LISREL analysis (e.g., fixed, free, or constrained elements of parameter matrices, such as the covariance matrix of measurement errors in observed outcome variables), and characteristics of the output file (e.g., method of estimation – such as maximum likelihood or weighted least squares – of the free parameters of the LISREL model, selected options in the printed output such as ▶ standard errors, t-values, residuals, total and indirect effects, model modification indices, standardized solution). Included with LISREL is PRELIS, which prepares raw data files for analysis in LISREL; estimates correlation, covariance, or asymptotic variance and covariance matrices, as well as generates bootstrapped estimates of the elements of specified matrices; and conducts simulation studies to generate variables specified to have particular distributional properties (Jöreskog & Sörbom, 1996b).

Since classic LISREL syntax is based on matrix algebra, recent LISREL versions (i.e., LISREL 8) have featured a graphical user interface. Interactive LISREL consists of a series of wizards that prompt the user for information about the model and data and allow the user to specify the model by drawing it onscreen through the path diagram functionality

(Du Toit & du Toit, 2001). A command syntax can automatically be created from the path diagram and may appear in a separate window. LISREL is then run to obtain parameter estimates and fit the specified model to the data. Moreover, another LISREL programming language, the SIMPLIS command language, which is not based on matrix algebra, requires little more than naming the observed and latent variables and declaring the relationships among them by specifying paths with equation-type statements (Jöreskog & Sörbom, 1993). In this way, one may switch from one mode to another: from path diagram mode to SIMPLIS syntax and from SIMPIS syntax to LISREL syntax.

The LISREL software program has been used to estimate and evaluate model fit in studies investigating ▶ quality of life issues in several patient populations including hypertensive patients with coronary artery disease (Gandhi, Ried, Huang, Kimberlin, & Kauf, 2012), patients with type 2 diabetes (Maddigan, Majumdar, & Johnson, 2005), or patients with chronic kidney disease (Saban et al., 2008), as well as to examine the psychometric properties and factor structure of some instruments measuring quality of life, such as the ▶ SF-36 Health Survey (Anagnostopoulos, Niakas, & Pappa, 2005).

Cross-References

- ▶ Confirmatory Factor Analysis (CFA)
- ▶ Exploratory Factor Analysis
- ▶ Latent Variables
- ▶ Measurement Error
- ▶ Multiple Regression
- ▶ Quality of Life
- ▶ Reliability
- ▶ SF-36 Health Survey
- ▶ Standard Errors

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Literacy

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Description

Literacy

Those who habitually use written communication in their lives in various ways take literacy (ActionAid UK, 2012) for granted, perceiving it not particularly as an enhancement of the ▶ quality of life, but as an essential process, along with oral communication. Those young people and adults who do not use literacy much or at all may see it as a goal to be achieved. Behind this spectrum of perceptions lie questions of the nature, value, and use of literacy.

Can Literacy Be Defined?

For many years, agencies such as UNESCO sought to define literacy, seeing it as a skill to be acquired at a certain minimal level. A UNESCO definition from 1958 refers to "reading and writing with understanding a short simple statement on his or her everyday life," while in 1978 UNESCO had moved to a more functional definition, namely, the ability to use literacy "in all those activities in which literacy is required for effective functioning of his group and community" (see UNESCO, 2005a: 153–154). These definitions implied crossing a threshold from illiterate to literate – a goal that was promoted as an objective of socioeconomic development. With the rise of ethnographic studies from the 1980s (Street, 1984, 1995), the ways in which people *use* literacy came into focus; it was no longer a question of defining a threshold, but of understanding what kind of literacy people use in the context of their local and global relations and of identifying the sociopolitical and cultural factors which structure the use of literacy; this led UNESCO to move away from a formal definition of literacy to an open-ended statement about its function:

> Literacy is the ability to identify, understand, interpret, create, communicate and compute, using printed and written materials associated with varying contexts. Literacy involves a continuum of learning in enabling individuals to achieve his or her goals, develop his or her knowledge and potential, and participate fully in community and wider society. (UNESCO, 2005b: 21).

Literacy is only as valuable as the purposes it serves, for individuals and groups. While literacy can be characterized as "communication involving text," there is no single definition; rather it is plural and multiple, shaped by many contextual factors. The notion of "text" is understood to include print-based materials (books, magazines, newspapers, posters, etc.) and electronic representation (data processing, e-mail, Internet, texting, etc.) used alongside other dimensions of communication in multimodal ways – image, graphic, cartoon, icon, sound, and animation (Kress, 2003).

Multiple Literacies

The multiple nature of literacy emerged from studies of literacy use in different contexts, asking questions about literacy as social practice, in the framework of the power relations of society (e.g., Collins & Blot, 2003; Prinsloo & Breier, 1996). Focus on the uses and meanings of literacy in individual lives and communities provided insights into the purposes that reading and writing serve. Barton and Hamilton (1998) called these practices "vernacular literacies," in contrast to dominant "schooled" literacies, and identified a range of purposes including organizing life (lists, notice boards, etc.), personal communication (letters, cards, notes, etc.), private leisure (books, magazines, newspapers, etc.), documenting life (records, certificates, diaries, albums, etc.), sense making (devotional readings, researching issues, exploring interests, etc.), and social participation (meeting notices, posters, minutes, etc.). In addition to the range of purposes that characterize multiple literacies, other factors such as language, institutional context, and mode of acquisition are distinguishing features. For example, literacy in an Indian tribal language expresses different identities and power relations than literacy in a state language. Again, the dominant literacies required by official institutions – lawcourts, government administration, or development agencies – are not the same as the "vernacular literacies" described above. Acquiring literacy in the context of an adult learning circle, as a community-based social event, leads to different practices than literacy acquired on school benches.

With regard to literacy promotion, agencies that advocate for universal literacy promotion may recognize literacy as a continuum of competencies but send mixed messages by simultaneously using headline statistics of "illiterates" who should become "literate." The policy debate lags behind the current analyses of how literacy is shaped by context and expressed in multiple ways.

Language and Scripts

Literacy is a language activity, and the choice of the language of literacy is critical in multilingual

contexts, especially where a nonlocal language, promoted through past colonization or centralized "nation building," dominates the educational and administrative systems. In these contexts, being literate is often equated with knowing the dominant language in which school textbooks and government communications are written. Local attitudes often reflect the hegemonic position of the official language, manifested by unjustified assumptions about the inferior nature of the local language. However, it is clear that children and adults learn literacy most readily when their first language is used (Bloch & Alexander, 2003; Trudell, 2004). On the basis of mother-tongue literacy, the learning of other languages and literacy in those languages may be more effectively acquired. Mother-tongue-based multilingual education is recognized as a sound educational approach, which offers both the cognitive advantages of initial learning and cultural validation through the first language and the opportunity of accessing learning and knowledge available through other languages (Bender, Dutcher, Klaus, Shore, & Tesar, 2005; UNESCO, 2003). These approaches make a clear distinction between the pedagogy of learning literacy and learning another language. Frequently, acquiring literacy in several languages involves the learning of different scripts (e.g., Arabic, Cyrillic, Devanagari, Ethiopic, Roman); however, learning a script (manipulating a set of symbols) and learning a language (internalizing new linguistic structures) are distinct – the latter being a much more demanding and longer term process.

Literacy and Development

The links between literacy and the quality of life are often most strongly articulated with regard to improving the opportunities of the poor and marginalized in developing countries (79 % average adult literacy rate as against 99 % in "developed" countries – UNESCO, 2011). International agencies and NGOs link the acquisition of literacy competence to enabling greater access to information (print, Internet, etc.); better health for families through reading relevant information and using medicines according to the instructions; employment, microenterprise, and economic development; and social participation and opportunities for ongoing learning. Wider societal benefits such as claiming rights and services, lower infant mortality, greater enrolment of girls in school, and increased gender equity are also attributed to higher literacy rates (UNESCO, 2005a). Literacy is one factor in socioeconomic development, and it is striking that a map of the areas of high poverty in the world is congruent with a map of low levels of literacy. However, no direct causal relationship can be established, simply because the causes of poverty and deprivation are multiple and the changes necessary to reduce poverty include dimensions of sociopolitical and structural change that go far beyond literacy (Rogers, 2011). While many benefits may derive, at least in part, from the use of literacy, it is in itself neutral and may also result in negative impacts, for example, through propaganda or ideological suasion.

Literacy is nevertheless a prerequisite for active participation in the global "knowledge economy" which is characterized by use of computing and rapid electronic communication. These technologies necessitate not only basic literacy competence but a "digital literacy" (Snyder, 2002) which is often not available to many rural populations or to those speaking languages not (yet) represented in the Internet. Learning as such takes place in many ways which may or may not require literacy; however, literacy is a basic instrument for participating in the structured learning opportunities of the mainstream education systems and is indeed the first skill taught in schools.

Active Literacy

Literacy acquisition can be an empowering process, enabling learners to challenge factors of marginalization and to assert rights and identities – the Brazilian educator Paulo Freire wrote of a conscientization process in which literacy learning had a key role (Freire, 1972). However, whether this is in fact the case depends on at least

two critical elements: the way in which literacy is acquired and the literate environment.

Adult literacy programs often focus on reading as the key skill in literacy, rather than writing, particularly those programs which neglect to address literacy purposes relevant to specific contexts. This is predicated on the assumption that what is needed is access to information, but it neglects two key uses of literacy: first, the fact that writing is often the more critical skill for poor and marginalized populations in order to claim rights and services, to fill in forms, and to obtain the documentation which the state requires (e.g., a birth certificate). Second, writing gives opportunity to give voice to a minority or indigenous population by expressing their identity – local knowledge, history, practices, and patterns of cultural behavior. These aspects, often sidelined in literacy-for-development programs, validate local realities and promote the awareness and self-confidence which are the basis for initiating, managing, and sustaining change. Approaches such as REFLECT (Archer & Cottingham, 1996) have sought to use writing as the entry point to literacy, while other programs have given prominence to expressing local cultures (Weber, Wroge, & Yoder, 2007).

The ▶ literate environment is often understood to indicate the range and quantity of written material that is available in a community – the books, newspapers, posters, digital technologies, and so on that people have access to. However, the concept encompasses also the opportunities to write, publish, and distribute materials (including the creation of websites), as well as the range and type of institutions that demand the use of literacy – schools, government administration, legal systems, or commercial enterprises (Easton, forthcoming). Analysis of the literate environment thus provides an understanding of how literacy is used at local or national level and an indication of what purposes the acquisition of literacy may serve for a particular group of learners. Once again, context emerges as a key variable; tailoring acquisition to the literate environment moves away from the position that providing basic literacy programs is simply "a good thing" regardless of circumstances.

Literacy Methods

In the same way as there is no universally valid definition of literacy, there is no one method of teaching or learning literacy. Methods depend on the learning group and their purposes – young people in peri-urban environments, rural women, and indigenous populations, for example. Where adult literacy programs are concerned, a key principle is to draw on the existing knowledge and life experience of the learners in their context (cf. Rogers, 2004). This means not only adopting an interactive pedagogical process but also deriving the purposes, content, and pace of the program for learner input and perceptions. Motivation to learn and use literacy is as critical as selecting an appropriate method, and so relevance and ready application of new competencies in context will influence effective learning as much as the particular method of acquisition. Thus, literacy is better learned along with other knowledge that people wish to acquire to improve their lives, not as a stand-alone skill. Using these basic approaches, methods of literacy instruction may include facilitation and discussions, printed materials (e.g., manuals, workbooks, primers, learner-generated materials), radio, TV/video, computer-based methods, or any combination of these. Methods in widespread use include those based on Freire's conscientization approach (Archer & Cottingham, 1996), Laubach's "each one teach one" (Laubach Literacy Ontario, 2011), Cuba's *Yo sí puedo* (s.d.), or multi-strategy (Faraclas & Stringer, 2001), among others.

Measuring Literacy

Governments and the international community are concerned to have reliable statistics of progress in literacy, expressed in the percentage of literate adults among the population. Aggregated globally, the 2011 estimates of adult literacy were 83 % (women 79 %, men 88 %). Such figures are available for a large number of countries (UNESCO, 2011), although they mask important differences within countries.

More critically, the validity of the statistics is questioned owing to the methods employed to measure literacy. Indirect methods of measurement are based on self-declaration in response to surveys for national censuses or household sampling; in other cases, estimates are based on an assumption that all those who have completed a number of years of schooling (e.g., four or five) have acquired usable literacy skills. The uncertain veracity of the responses obtained in these ways has led to the development of direct testing methods, such as the International Adult Literacy Survey (OECD & Statistics Canada, 2000) and its successors, the Adult ,Literacy and Lifeskills Survey (ALL – Statistics Canada & OECD, 2005), and the Programme for the International Assessment of Adult Competencies (PIAAC – OECD, s.d.), as well as the Literacy Assessment and Monitoring Programme (LAMP – UIS, 2009). These approaches test a sample of the population directly in reading texts of different genres and aim at results that indicate levels of literacy rather than a literate/illiterate categorization. Such methods are more resource intensive but offer the hope of more reliable literacy data in the future.

Literacy for Quality Living

Debates about the nature of literacy, the role of context and of globalization, and the best ways of teaching and learning literacy are vigorous and ongoing. They serve to ask critical questions of actual practice and thus sharpen the perceptions and programs of communities and organizations concerned to increase access to written communication of all kinds. Application of learning to enhancing the quality of life depends on relevance to learners and inspiration for change; it is from these principles that understanding current uses of literacy and designing ways to give greater access to literacy must take their cue.

Cross-References

- ▶ International Literacy Assessments
- ▶ Literate Environment

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Literacy Achievement

► Reading Literacy Achievement

Literacy and Numeracy Assessment

► PIAAC (Latest Survey on Literacy)

Literacy Environment

► Literate Environment

Literate Enabling Environment

► Literate Environment

Literate Environment

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Synonyms

Learning context, supportive; Literacy environment; Literate enabling environment

Definition

The terms *literate environment* and ► *literacy environment* have come into increased usage over the last two decades to designate the characteristics of a particular setting – or of society at large – that support the acquisition, use, and retention of literate and numerate skills. A *literate environment* is thus one that offers *a sufficient density of easily accessible and relevant reading materials and a sufficient frequency of opportunities to apply literate or numerate competency to personal and social benefit* so that learners are motivated to master the art and ARE more likely to maintain and increase their skill level over time. *Literacy environment*, on the other hand, is a more neutral and generic term for the nature of those surroundings, whether or not they are particularly supportive of ► learning and literacy retention.

Description

Two distinct and overlapping arenas of application for these ideas are the most common: first, school settings, where the concern is to highlight the importance of surrounding children with resources and stimuli that support the acquisition and use of *the three Rs* (e.g., Searfoss, Mallette, & Readence, 2001), and second, the broader contexts of adult education and literacy programs or campaigns (e.g., Torres, 2008), where the focus typically expands to include not just the

provision and availability of reading materials once the particular cycle of organized learning is completed but also factors in the larger environment that affect provision of reading resources and determine the level of opportunity to put new literate or numerate skills to economically and socially beneficial use.

The latter concept in particular has an evident and strong connection with ▶ quality of life issues. Obviously extending quality learning opportunities throughout the globe to population groups previously deprived is a key objective in movements like those that promote *Education for All* or the achievement of the Millennium Development Goals (cf. [United Nations Educational, Scientific & Cultural Organization] UNESCO, 2006). In addition the ▶ Human Development Index, a measure of quality of life devised in part by the United Nations Development Program, gives prominent place to indicators of learning and ▶ educational attainment along with those for ▶ health and longevity.

These concepts are, however, a good deal more complex than may first appear, and it is consequently wise to introduce a few distinctions:

- *To begin with*, as employed here, the term *literacy* covers all the various uses and applications of written notation and deciphering skills. It therefore includes *numerate* competencies along with those related to text.
- *Second*, as implied above, the notion of a literate or literacy environment is every bit as critical and applicable *at the societal level* as it is at the local or classroom one.
- *Third*, such an enriched environment functions to support at one and the same time (a) the *acquisition* of literate skills and (b) their *retention or ongoing application*. Though the two types of activities are equally relevant to basic schooling and to adult education, more attention is typically given in the schooling domain to support for *acquisition*, since students who successfully master literate skills should have ample opportunity to use them at subsequent levels of their education. Adult educators, on the other hand, tend to be particularly concerned with *retention and use* of literacy, since their programs tend to be of shorter duration and because both motivation for such offerings and durable mastery of lessons learned depend to a great extent on the degree to which the new skills can be exercised and put to beneficial use in daily life.
- *Fourth*, literacy environments should be understood as a *plural* noun, because such phenomena are specific to different languages and cultures, and several of them – one or more dominant and the others subordinate – may coexist in any given country.
- *Finally*, all these varieties of literacy environments may be considered from a *supply-side* point of view – that is, with an emphasis on factors that augment the quantity and quality of the written material or numerical communication that is made available in the context in question – and from a *demand-side* perspective, or with respect to the forces, activities and circumstances in the same context that *require* literate and numerate skills and provide an arena for their beneficial deployment. I will suggest in this article (a) that it is not possible to fully understand the dynamics of a literate environment – or to improve one – without adopting *both* perspectives and (b) that most related work to date has given much more emphasis to the supply side than to demand considerations.

Because basic education has been largely universalized in industrialized countries and written media are widely available there – notwithstanding persistent pockets of need as well as manifest inequities in access to higher education and to opportunities for ▶ lifelong learning – the existence of a literate environment in societies of the North is, rightly or wrongly, taken largely as a given. Related attention in the industrialized world therefore focuses principally on the supply side of the question and particularly on improving childhood classroom and home environments so that young people are more effectively surrounded by stimuli, opportunities, and quality materials for developing reading, writing, and mathematical skills and so more effectively prepared to confront an adult world and job market that are assumed to demand and reward a high

level of literacy (Searfoss, Mallette, & Readence, 2001). A good deal has been made in this regard both of the lack of such contextual supports in the less well-endowed schools of rich countries and, particularly, of the radical disparity between the quality of literacy environments in the homes of lower-income families and the nature of those in middle- or upper-class households (e.g., Bennett, Weigel, & Martin, 2002). The former are typically characterized by limited availability of reading materials and few adults who make use of them, whereas the latter often provide not only a much richer palette of books, publications, and (now) electronic media but two other critical resources as well: first, reading materials that are better adapted to childhood interests and needs and second, adult role models more ready and able to help children with this dimension of learning.

In less industrialized and developing areas of the world, on the other hand, one cannot as easily assume either that the density of presently available uses for literate and numerate skills is sufficient to sustain demand beyond the minority of the population with access to jobs in the formal labor market or that current provision of media, publications, libraries, and even textbooks is ample enough *at ground level* (and particularly in the rural and depressed urban areas that EFA advocates hope to reach) to furnish adequate grist for learning.

Under these circumstances, one is obliged to *assess* the state of the literacy environment rather than simply to *assume* it – and to come up with strategies for upgrading these background characteristics in tandem with efforts to improve the instructional ones (Easton, 2013). It is an activity that does not come very naturally to educators, due to the prevalence of what is sometimes called *the autonomous model of literacy*: that is, the firmly held conviction that literacy is its own reward for being, an art whose mastery confers major benefits ipso facto and regardless of contextual conditions (Street, 2003). Believers in that creed, perhaps born in part from historical Western (and Islamic) experience with dissemination of the Holy Writ and from persuasions about its unilateral potency, may see little need to dissect the anatomy of literate environments.

There is, however, a strong and significant relationship between these issues and the habitual concerns of at least one brand of educators: vocational-technical teachers and *HRD* trainers – that is, those professionals charged with training and ▶ continuing education in business, industry, and government – this despite the large apparent gap that separates adult basic education from corporate employment and large institutional settings. HRD personnel must by nature be highly attentive to the immediate applicability of the skills they help develop to the workplace environment and supportive of modifications in it that promise to put new learning to more effective and beneficial use (e.g., Sackmann et al., 2009). As much could be said of vocational-technical education teachers, who are usually people with a background in the industries concerned and with an ingrained habit of visiting worksites, talking about training needs, and evaluating learning applications.

Discussion

Underlying this debate lie both a fundamental contrast and a potential complementarity between the supply and demand sides of the issue. The former refers, of course, to legitimate concerns with providing books, newspaper, other written media, and a variety of related supports to present and potential learners. These must certainly be major educational objectives in any setting and particularly in those where related resources are so thin on the ground. *Demand-side* phenomena, on the other hand, have to do with the prevalence in the surrounding environment of solvent and sustainable activities that *require* literate competencies of those responsible for their execution and management and that thus *create* a practical and pressing need for learning, as well as activities for immediate application of lessons learned (Easton, 2013).

Once again, educators have traditionally focused on the supply side of the issue. They are officially charged, after all, with *provision* of

learning opportunities and instructional guidance. To cite an old ironic quip apocryphally attributed to Werner von Braun, the German-turned-American rocket scientist of the 1940s and 1950s, "We put the rockets up. Where they come down is not our department." That is of course a gross and unjust characterization: few educators are so blasé about what their students become, and legions of them have made major efforts to connect their teaching with live contexts of knowledge use. Nonetheless, most of the activities that create demand for new learning and skills *do* lie outside of the education *department* itself and in realms with which educators are typically much less familiar or at least up-to-date. Notably, for example, needs for literate skills in developing countries are largely dependent on the density of other locally fueled economic activities and services in the same environment and on the way in which they are organized. Even the quantity, quality, and availability of media are intimately related to communication needs born from the development and social dynamics of ▶ civil society (Shiohata, 2010).

It follows – and this is precisely the core of the *literacy environment* argument – that policies likely to ensure durable improvement in educational outcomes and literacy levels must cover both sides of the issue and tend carefully to their intersection. This is scarcely a new discovery, at least in adult education (e.g., Merriam, Caffarella, & Baumgartner, 2007). A timeless maxim from that field says that "teaching is the art of putting people into situations from which they cannot escape without learning." In short, the educator must tend to design of *the environment* as much as to the design of formal instruction – a task that extends well beyond the classroom.

Cultivating that intersection in developing countries and resource-poor environments typically means more than prospecting training-employment linkages and practical applications of learning, as any self-respecting HRD specialist or vocational-technical educator would of course do. Given the dearth or the very nascent state of formal employment in such settings, it also means joining forces across sectors to promote, upgrade, and/or expand activities that put literate competence to productive use, while working out strategies of alternation between learning and application that enhance both. Such approaches entail in turn that educators themselves become increasingly *literate* in some of the economic, social, and technical mechanics of production in the localities in question.

An example of measures taken on the less familiar demand side of the question may help to drive home the point. It is drawn from African agricultural markets and production cooperatives where – depending on their organizational structure and the level of management responsibility exercised – local employees may be called upon to fulfill new and unaccustomed technical functions. Whereas broadscale general literacy campaigns in rural Africa have not been met with great success (Maruatona, 2008) – in part, at least, for lack of the demand-side factors mentioned – cooperative training programs linked to schemes for local assumption of market management responsibility and related increases in local retention of profit margins, like those supported in several African countries by CLUSA, have had major effects on rates of learning and level of retention among adult coop members ([Cooperative League of the United States of America] CLUSA, 2008). Similar results have been noted in programs involving equivalent linkage between new learning and other fields of practical application like health care delivery, microfinance (Kim, Watts, & Hargreaves, 2007), irrigation management, and local governance (Bingen, Robinson, & Staatz, 2000), even in resource-poor settings stripped of most of the traditional trappings of literacy – as long, that is, as the connection between learning and application is carefully designed and usage procures recognized benefits, material or immaterial to participants (Easton et al. (1998)). Under these circumstances, in effect, educators and sponsors collaborate in building the parts of a literacy environment that did not previously exist and so in awakening truly *effective* demand for learning.

Cross-References

- ▶ International Literacy Assessments
- ▶ Literacy

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Literature

- ▶ Arts and Quality of Life

Livability

- ▶ Quality of Place

Livability Index

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Synonyms

Economist intelligence unit quality of life index; Generic liveability index; Mercer quality of living survey™; Monocle most liveable cities index™

Definition

A livability index is a table that ranks a set of cities, regions, or nations according to a defined combination of quantitative and qualitative properties. The most prominent of these are developed and produced by commercial interests. The properties are usually based on data from subjective surveys of, for example, "life satisfaction," "well-being," or "happiness," as well as on data yielding more objective determinants of "quality of life," such as assessments based on public statistics, "economic climate," "political stability," or "public services." A livability score or ranking given by such an index is an aggregate account of the situation in a city, region, or nation that is purported to obtain there over a given period, usually 1 year.

Description

The concept of "livability" has helped to shape the literature on social indicators and quality of life since the 1980s (Veenhoven, 1993; Veenhoven & Ehrhardt, 1995). However, some notion of livability was popular at the end of the nineteenth century, when local leaders and real estate entrepreneurs used it to attract settlers to newly established towns in the western United States. The term was used in this way until the 1970s, when popular media and cultural bodies adapted the concept to describe the agreeable lifestyle said to be offered by certain cities or regions. In 1972, the Greater Vancouver Regional District adopted the concept of "livability" as a core objective (Timmer & Seymoar, 2005), and by 1977, the United States' National Endowment for the Arts had sponsored a series of "livability" programs through its Architecture and Environmental Arts Program, including the city edges, livable cities, and neighborhood conservation projects (National Endowment for the Arts, 2000). Indeed, it was in part the popularization of livability as an ideal associated with quality of life and well-being that has motivated the development and promotion by commercial organizations of "livability indexes" since then.

In this sense, the livability index represents a reification of the concept of "livability" that is discussed in the academic quality of life literature. There are two aspects to this reification. First, early debates in the quality of life literature had contrasted livability theory with comparison theory. While livability theory held that persons' judgments about quality of life referred to absolute standards or universalizable norms, comparison theory held that people make judgments about quality of life based upon comparison with some past experience or with their own perceptions of the experiences of others (Veenhoven & Ehrhardt, 1995, pp. 34–36). In recent years, researchers have attempted to coalesce the two theories by proposing the view that persons' judgments about quality of life implicate both absolute standards and recent changes in quality of life (Hagerty, 1999). It is a particular form of this syncretic use of the concept that predominates in contemporary efforts to develop and compile livability indexes.

Second, especially in recent decades and in the global North, political and commercial actors have taken up the idea that livability is both desired by the general public and provides a competitive advantage in conditions of post-industrialization and globalization. In this usage, the concept has emerged as a key discourse of legitimation for government policy and business activity. As such, "livability" is stretched to encompass both concerns with quality of life and with the surplus that is generated by economic growth while being employed as a tool to promote a city, region, or in some cases a nation's attractiveness to global business or a transnational cosmopolitan "creative class" (Florida, 2002). Indeed, by 2008, the perspective upon livability as a combination of quality of life, economic wealth, and status competition had informed a major international summit on "World Cities: Achieving Liveability and Vibrancy" (Ling & Yun, 2010).

Hence, the livability indexes have a somewhat problematic relationship with livability theory, as it is discussed in the quality of life literature. While livability theory posits that people examine and assess their own experiences in relation to some absolute, such as "poverty" or "health," or some universal norm, such as "justice" or "fairness," the combining of such quality of life measures with comparative measures such as "cost of living" or "innovation" in a league table-like index produces an epistemological tension. On the one hand, absolute or normative standards supply a concrete benchmark against which quality of life is measured and understood, even if comparative measures are included, while, on the other hand, the process of ranking livability, or syncretic livability-comparative measures, has the effect of relativizing judgment overall. That is, the methodology that is applied by the commercial developers of the livability indexes fosters a form of relativism that substitutes instrumental goals (moving up the ranking scale) for absolute standards or universalizable norms or for assessing quality of life in comparison

with an aggregated representation of personal experiences in the past or of others.

This relativizing of judgment and the unresolved epistemological tension that is associated with it creates a vacuum in terms of substantive judgment about quality of life. This vacuum is occupied by the prevailing discourse of the post-industrial, global competition state (Drache & Getler, 1991), in which unfettered access to consumer goods and services and the negative freedoms associated with mobility, creativity, and authenticity stand in as the normative reference point for judgments relating to quality of life. When represented in aggregate, the livability indexes therefore tend to subsume aspects of livability theory, such as concerns with material distribution, social inclusion and participation and, importantly, impact within the ecosphere, to negative liberties such as consumption choice. It is in these terms, as a means for promoting a particular place with the aim of attracting international capital and capital-intensive "creative" labor, that politicians and business actors popularize and promote the overall rankings provided by major livability indexes. Even though they include considerations such as the presence of museums, arts events, and café culture, the commercial livability indexes offer a view of quality of life that is somewhat at odds with that presented in most academic quality of life research.

The commercializing of the concept "livability" in these terms in some sense contravenes the epistemic and normative claims that have been central to the theorization of it and to the practical application of livability theory through efforts such as the United Nations Development Programme's successive Human Development Reports or the Organisation for Economic Co-operation and Development Better Life Initiative, for example, both of which do have their own different shortcomings (OECD, 2011; UNDP, 2011). From within a social science perspective, the emergence and uptake by policymakers, politicians, and planners of livability indexes has been closely linked with demographic, socioeconomic, and techno-industrial shifts to a "knowledge" or "creative society" (Peck, 2005). From within this same perspective, the uptake of livability indexes is attributed to institutional responses to public demands for a more comprehensive understanding of the common good, one that calls into use various nontraditional metrics by and in cities (Woolcock, 2009).

Methods Used

The methods employed by the commercial organizations that collate livability indexes vary. In general, a methodological approximation of livability theory frames the measurement of "living standards" against criteria such as political climate; social, economic, and environmental factors; personal safety; and availability of health, education, transport, and other public services within a geographical area. The reference for such standards is taken to be those currently obtaining for above-average income earners in the global North. That is, they presume the normality of a free, secular, and open public sphere; the protection of liberal human rights and especially property rights, functioning social infrastructure, and bureaucracy; and efficient dispensation of the rule of law, especially in relation to contract and corporate law.

For example, the PwC Cities of Opportunity Index focuses specifically on 26 global capital market centers (despite many other facets) that are said to "represent a broad geographic sampling and reflect a balance between mature and emerging economies." The 66 variables selected by PwC were divided into 10 indicator categories based on criteria of relevance, consistency across the sample, public availability and collectability, currency, and freedom from skewing and local nuances and judged to be "truly reflective of a city's quality or power." Indicators were normalized in most instances, with the aim of minimizing the likelihood of a city doing well solely because of its size and historic strength. Each of the variables is treated with equal importance within the 10 equally weighted categories:

1. Intellectual capital and innovation
2. Technology readiness
3. Transportation and infrastructure
4. Health, safety, and security
5. Sustainability

6. Economic clout
7. Ease of doing business
8. Cost
9. Demographics and livability
10. Lifestyle assets (PwC, 2011)

In another example, the Economist Intelligence Unit (EIU) ranks and defines "quality of life" in terms of "living standards" by collecting data on indicators that are grouped into categories. These are rated on an ordinal 1–5 scale, which is weighted to produce the index and provides the basis for ranking (in the EIU case, cities):

1. 25 % stability: prevalence of petty crime and violent crime, threat of military conflict, threat of civil unrest/conflict, and threat of terrorism
2. 20 % healthcare: availability of public and private healthcare, quality of public and private healthcare, availability of over-the-counter drugs, and general healthcare indicators
3. 25 % culture and environment: humidity/temperature rating, discomfort of climate to travelers, level of corruption, social/religious restrictions, level of censorship, recreation: sport, culture, food and drink, and availability of consumer goods and services
4. 10 % education: availability of private education, quality of private education provision, and public education indicators
5. 20 % infrastructure: quality of road network, public transport, and international links; good-quality housing; quality of energy and water provision; and quality of telecommunications infrastructure (Economist Intelligence Unit, 2009)

Similarly, the Mercer Quality of Life Index combines questionnaire responses with 39 quantitative "quality of life determinants," grouped into 10 weighted categories:

1. 23.5 % political and social environment: relationship with other countries, internal stability, crime, law enforcement, and ease of entry and exit
2. 4 % economic environment: currency exchange regulations and banking services
3. 6.4 % sociocultural environment: limitations on personal freedom, media, and censorship
4. 19 % medical and health considerations: hospital services, medical supplies, infectious diseases, water potability, waste removal, sewage, air pollution, troublesome and destructive animals/insects
5. 3.4 % schools and education: standard and availability of schools
6. 13 % public services and transportation: electricity, water availability, telephone, mail, public transport, traffic congestion, and airport
7. 9 % recreation: variety of restaurants, theater/musical performance, cinemas, sports, and leisure
8. 10.7 % consumer goods: availability of food/daily consumption items, alcoholic beverages, and cars
9. 5.1 % housing: housing, household appliances/furniture, and maintenance and repair services
10. 5.9 % natural environment: climate and record of natural disasters (Marsh Mercer Kroll, 2009)

In the list below, again taken from the EIU, an approximation of comparison theory informs the collection of data on "cost of living." In fact, the EIU "quality of life" ranking forms a part of the "cost of living" index. The overall project is designed to address the requirement that is created because "companies give a premium (usually a percentage of a salary) to employees in locations that present extraordinarily difficult living conditions, excessive physical hardship or notably unhealthy conditions. The EIU Expatriate Quality of Life Index quantifies the level of hardship in all of the locations covered by the World Cost of Living survey" (Economist Intelligence Unit, 2011). The cost of a representative basket of goods and services considered to provide a certain standard of living within a geographical area. This standard of living is taken to be commensurate with that of a typical business executive or senior public servant in the global North. These measures are then collected and ranked or "indexed" in relation to a single site, which is denoted as the "reference" site. The reference site is granted a "base = 100" score (as representing the situation that currently obtains

a specific geographical area, usually New York), against which other data sets collated for other sites are ranked. For example, the EIU gathers data (in each city) on the cost of 167 products or services, including but not limited to food, toiletries, clothing, domestic help, transport (public and private/rental), and utility bills. The *EIU* Cost of Living Index is calculated from the price data, in 12 subcategories, a "shopping basket" containing:

1. Alcoholic beverages
2. Household supplies
3. Personal care
4. Tobacco
5. Utilities
6. Clothing
7. Domestic help
8. Recreation and entertainment
9. Transportation
10. Housing rents
11. International schools, health, and sports
12. Business trip costs (Economist Intelligence Unit, 2011)

As have many cities and regions, the municipal government of the City of Melbourne, Australia, has undertaken to review its rankings in the various livability and related indexes. Although specific to that city, the list provides a clear idea of the scope and breadth of livability indexes in use around the world:

1. 2thinknow's Global Innovation Review
2. Anholt/Gfk Roper's City Brands Index
3. Australian Conservation Foundation's Sustainable Australian Cities
4. Demographia International Housing Affordability Survey
5. ECA International 15 Best Locations in the World for Asian to Live
6. Economist Intelligence Unit's Cost of Living indexes
7. Lee Kuan Yew World City Prize
8. MasterCard Worldwide's Worldwide Centers of Commerce Rankings (no longer published)
9. MasterCard Worldwide's Worldwide Environmental Rankings (no longer published)
10. Mercer Quality of Living rankings
11. Monocle magazine's Most Liveable Cities rankings
12. RMIT's Global University City Index (under review and no longer published)
13. SportBusiness Ultimate Sports City Award (Casey, 2011, p. 25)

Cross-References

- ▶ Comparison Theory
- ▶ Livability Theory
- ▶ Quality of Life

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Livability Theory

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Synonyms

Habitability; Person-environment fit

Definition

Livability is the degree to which a living environment fits the adaptive repertoire of a species. Applied to human society, it denotes the fit of institutional arrangements with human needs and capacities. Livability theory explains observed differences in happiness in terms of need-environment fit.

Description

Assumptions

Livability theory involves the following six key assumptions:

1. Like all animals, humans have innate needs, such as for food, safety, and companionship.
2. Gratification of needs manifests in hedonic experience.
3. Hedonic experience determines how much we like the life we live (happiness). Hence, happiness depends on need gratification.
4. Need gratification depends on both external living conditions and inner abilities to use these. Hence, bad living conditions will reduce happiness, in particular when its demands exceed human capabilities.
5. Societies are systems for meeting human needs, but not all societies do that job equally well. Consequently, people are not equally happy in all societies.
6. Improvement of the fit between social institutions and human needs will result in greater happiness.

A first formulation of this theory is found in Veenhoven (1993), and later elaborations can be found in Veenhoven and Erhardt (1995), Veenhoven and Ouweneel (1995), and Veenhoven (2000, 2010a).

Contrary Theories of Happiness

Other views on happiness are less optimistic about the chance of improving the human lot. One perspective centers on a family of theories that see happiness as the result of cognitive comparison, while another set sees happiness as a stable "trait" rather than as a variable "state."

Comparison Theories

These theories assume that happiness results from comparisons between notions of how life should be and how it actually is. The greater the gap between what one wants and what one has, the less happy one is (Michalos, 1985). In this theory, "wants" differ from the above mentioned "needs." Firstly, wants are held consciously, while one may be unconscious of what one needs. Secondly, wants are social constructs and as such likely to vary across cultures, while needs are hardwired and universal. Thirdly, wants tend to be endless, while needs can be satisfied. This latter point implies that great happiness is not possible. If we always want more than we have, we will never get any happier. It is for this reason that the pursuit of

happiness has been typified as a "hedonic treadmill" (Brickman & Campbell, 1971). Variants of this theory emphasize different standard of comparison and different mechanisms that inflate aspirations. See the lemma on "contentment" in this encyclopedia.

Trait Theories

These theories hold that happiness is a static characteristic of an individual, comparable to the color of one's hair. One variant claims that happiness is largely genetic, some people are born to be happy, and others to be constitutionally depressive (e.g., Lykken, 1999). Another variant is that our early experiences program us to enjoy life or not. Cummins' (1995) set-point theory assumes that we are all hardwired to feel reasonably happy (between 7 and 8 on scale 0–10) and that homeostatic mechanisms keep us around that level, unless extreme circumstances push us below or above.

Evidence

Since we cannot yet look in people's heads, we cannot test these competing theories as such. Yet we can check some of their implications. One implication of both comparison theory and trait theory is that average happiness will be about the same all globally. This is clearly not the case, average happiness on a scale 0–10 is 2,8 in Togo and 8,2 in Denmark (Veenhoven, 2012a). Another implication is that average happiness will remain at the same level, even if living conditions deteriorate or improve in a nation. This appears not to be the case either. Average happiness dropped dramatically in Russia after the Ruble crisis in the late 1990s, and in the 1990s, happiness also dropped in other postcommunist countries where major transformations took place. Yet average happiness has gone up in most developed countries over the last 30 years, and in the last 10 years, it has also increased in the postcommunist countries (Veenhoven, 2012b). Both the differences in average happiness across nations and the rise of happiness over time correspond with social qualities, such as economic development, political democracy, and good governance.

Follow-up studies at the individual level also show considerable changes in happiness over time, which are linked to both things that happen in our lives, such as marriage and bereavement (Headey, 2006).

Still another piece of evidence is that conditions for happiness appear to be fairly universal. Though there is some variation in what people think will make them happy, actual correlates of happiness are strikingly similar all over the world (Veenhoven, 2010b).

All this fits livability theory quite well.

Political Relevance

The theoretical differences in happiness discussed here are no mere academic hairsplitting. If livability theory is wrong, there is no point in trying to create greater happiness for a greater number of citizens. So far, the data shows that this theory is right; hence, creating greater happiness still qualifies as a political goal.

Cross-References

▶ Happiness
▶ Need Theory

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Livable Cities

► Healthy Communities
► Sustainable Communities Movement

Liveability

► Subjective Indicators of Well-Being

Liveliness in Africa

► Vitality, Community, and Human Dignity in Africa

Living Conditions and Well-Being Using German Socio-Economic Panel

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Synonyms

Aspiration spiral theory applied to Germany; House design and quality of life in Germany; House facilities; House size and quality of life in Germany; Housing conditions and quality of life in Germany; Housing costs theory; Housing environment and quality of life in Germany; Housing satisfaction in Germany

Definition

The relationship between living conditions and well-being has usually been examined by determining how housing environment is associated with broad indicators of well-being. Broad indicators of well-being include not only ► subjective well-being but also mental health. In the literature on housing, subjective well-being has mainly been measured in terms of its cognitive components: ► satisfaction with life as a whole (hereafter, life satisfaction) and housing satisfaction, which is satisfaction with one of the specific domains of life (hereafter, ► domain satisfaction). Housing environment consists of several factors, such as type of house, house size, house condition, house facilities (e.g., presence of garden, balcony, and central heating), and homeownership status.

The following description is mainly based on a prospective panel study using data from the German Socio-Economic Panel (Nakazato, Schimmack, & Oishi, 2011). The German Socio-Economic Panel (hereafter, SOEP) is one of the panel surveys that have been conducted annually since 1984 in order to collect longitudinal data from nationally representative households living in Germany. The objective of this

study was to examine whether improving living conditions by moving produced lasting effects on well-being in order to explore theoretical explanations for the ▶ Easterlin Paradox. The focus of this entry is on the well-being of the general public and not on the well-being of households in substandard living accommodations.

Description

For many people, living in a beautiful big house is a part of dreams (Cantril, 1965). Not surprisingly, people in wealthy countries have aspired to purchase bigger and better houses by using the increase in their wealth over the prior decades. According to evidence provided by previous studies, this improvement in the quality of individuals' housing environments should enhance their life satisfaction. This is because prior cross-sectional studies have reported (a) a moderate positive relationship between ▶ life satisfaction and housing satisfaction (e.g., Campbell, Converse, & Rodgers, 1976), (b) that objective housing environment predicts housing satisfaction (esp., housing size, Campbell et al., 1976; homeownership, Lu, 1999; condition of house, Peck & Stewart, 1985), and (c) a positive relationship between objective housing environment (e.g., size, type, and condition of house) and global measures of well-being (see Evans, Wells, & Moch, 2003, for a review).

Further, several contemporary studies have provided strong evidence for a causal relationship between living conditions and well-being based on data from large longitudinal panels (e.g., Diaz-Serrano, 2009; Pevalin, Taylor, & Todd, 2008). These studies examined whether changes in objective housing environment, which were mainly produced by moving, predicted changes in well-being (housing satisfaction and mental health). For example, Pevalin et al. (2008) found that changes (decrease/increase) in the condition of one's home (e.g., adequate heating facilities; leaky roof; damp walls, floors, and foundation) predicted changes in mental health. In sum, prior studies have revealed that obtaining a better house produces improvements in housing satisfaction and mental health, consequently yielding improvements in life satisfaction.

However, it is also noteworthy that researchers have repeatedly found that an increase in wealth does not necessarily translate into an increase in subjective well-being. For instance, Diener and Oishi (2000) showed that national average levels of life satisfaction in wealthy countries have remained constant or increased only slightly over the course of many years despite substantial economic growth. This discrepancy between increased national wealth and stagnation of well-being has been called the ▶ Easterlin Paradox. The main purpose of this entry is to use SOEP data to test possible theories to explain the reasons for this phenomenon in the context of improving living conditions.

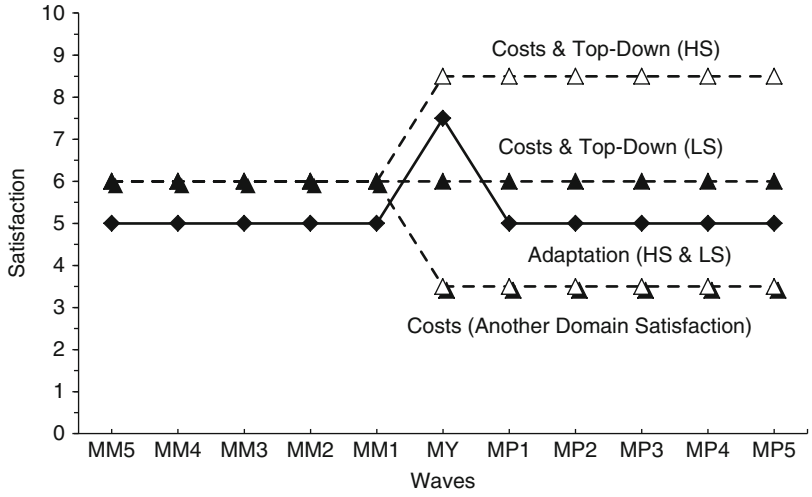
Theoretical Predictions

Possible theoretical explanations for the fact that well-being has stagnated even as living conditions have improved come from ▶ hedonic adaptation theory (see also ▶ adaptation-level theory and ▶ aspiration theory), housing costs theory, and top-down theory (cf., ▶ top-down QOL models). The trends in average housing satisfaction and life satisfaction predicted by these theories are shown in Fig. 1.

Hedonic Adaptation Theory

Hedonic adaptation theory is usually used to explain weak and transient effects of living conditions on well-being (Diener, Lucus, & Scollon, 2006). This theory assumes that individuals' well-being increases or decreases after some ▶ life events, but that it gradually returns to its initial levels after a certain period of time. Adaptation effects occur because either the affective system itself or people's attention (on which affective experiences rely) is insensitive to constant stimuli or a stable environment. It is also possible that adaptation occurs because individuals' aspirations increase in parallel with improvement in their life circumstances (Diener, Lucas, Schimmack, & Helliwell, 2009).

Accordingly, this theory predicts that both housing satisfaction and life satisfaction increase



Living Conditions and Well-Being Using German Socio-Economic Panel, Fig. 1 Theoretical predictions of average trajectories of housing satisfaction and life satisfaction before and after moving. *Note*. Adaptation, Costs, and Top-down indicate hedonic adaptation theory, housing costs theory, and top-down theory, respectively. HS and LS mean housing satisfaction and life satisfaction, respectively. MY, MM1–MM5, and MP1–MP5 indicate the moving year, moving year minus 1–5 years, and moving year plus 1–5 years, respectively. Satisfaction status predicted by the theories at each time point is only provisional. For example, the gap between the moving year satisfaction predicted by "Adaptation (HS & LS)" and that predicted by "Costs & Top-Down (HS)" has no meaning

after improvement in housing environment due to moving, but that the increases are not persistent due to adaptation effects.

Housing Costs Theory

This theory assumes that improvements in housing environment due to moving inevitably lead to costs in terms of conditions in other life domains (e.g., longer commute, financial burden, loss of existing social relationships; Diener et al., 2009). Unlike hedonic adaptation theory, this theory does not predict even temporary changes in life satisfaction because lasting increases in housing satisfaction are offset by decreases in satisfaction in other domains. Further, even if benefits and costs offset each other overall, moving into a better house produces more benefits than costs for some individuals and more costs than benefits for other individuals.

In sum, this theory makes the following predictions: on average, housing satisfaction shows lasting improvements after moving, whereas life satisfaction does not show even temporary changes because of decreases in satisfaction in other domains. At the individual level, the rank order of housing satisfaction changes after moving, and the change in housing satisfaction after moving also produces changes in the rank order of life satisfaction.

Top-Down Theory

Unlike the previously mentioned theories, which assume at least temporary bottom-up effects, this theory presumes that satisfaction in specific domains of life such as housing has no causal effect on judgments of overall life satisfaction. On the contrary, judgments of overall life satisfaction contribute to satisfaction with specific domains of life regardless of actual living conditions (Diener, 1984; Schimmack, 2008). Accordingly, improvements in housing environment produce no effects on life satisfaction.

Therefore, on average, housing satisfaction shows lasting increases after moving because objective housing environment does contribute to judgments of housing satisfaction. In contrast, life satisfaction does not change after moving. The predictions of top-down theory are the same

as the predictions of housing costs theory at the average level, but there are differences in these theories' predictions at the individual level. The individual rank order of housing satisfaction changes after moving; however, the rank order of life satisfaction does not change because changes in housing satisfaction do not contribute to changes in life satisfaction.

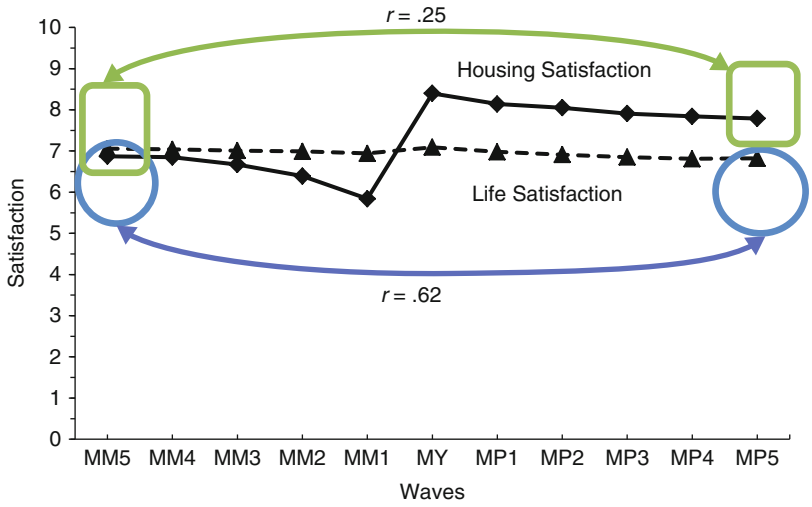
See Nakazato et al. (2011) for more detailed explanations of these theories (in fact, we divided adaptation theory into hedonic treadmill theory and aspiration spiral theory).

Advantages of a Two-Intercept Two-Slope Model

To examine these theories, Nakazato et al. (2011) analyzed data from individuals who changed their housing situation only once during the period from 1991 to 2007 for housing-driven reasons (e.g., their house was too small). The sample consisted of 3,658 individuals from 2,162 households. Individuals' self-ratings of housing satisfaction and life satisfaction during each year were used. It was confirmed that participants reported increases in various aspects (e.g., size, design, and equipment) of their housing environments. We used two-intercept two-slope ▶ latent growth curve modeling to examine the stability or change in satisfaction judgments before and after improvement in living conditions due to moving on both the whole-sample and individual levels. Our model was limited to the period ranging from 5 years before moving to 5 years after moving in order to obtain stable parameter estimates. Our model is similar to multilevel models that were usually used to examine trends in well-being before and after life events (e.g., marriage, unemployment, bereavement; see Lucas, 2007, for a review). However, our model has several advantages for the current study:

- First, this model allows for the estimation of both short-term and long-term effects before and after a life event (i.e., moving in this article). Including two ▶ intercepts and two slopes enables these estimations. The short-term effects are estimated by slopes, and the long-term effects are estimated by changes in values of intercepts from before moving (i.e., satisfaction status 5 years before moving) to after moving (i.e., satisfaction status 5 years after moving).
- Second, in this model it is possible to examine the stability of and changes in satisfaction judgments at the individual level and at the whole-sample level, whereas previous models only estimated average trends (cf., ▶ hedonic adaptation). This advantage is derived from the model's capability of using latent factors to estimate variation between individuals and to examine correlational or causal relationships between these latent factors; multilevel models lack the latter ability. Covariation between the variances of the two intercepts shows stability and change in the rank order of satisfaction judgments. Accordingly, this model allows researchers to examine whether individuals' satisfaction judgments following events (i.e., 5 years after moving) are related to their baseline levels (i.e., 5 years before moving) while simultaneously examining the average trends.
- Finally, this model allows for a sophisticated examination of whether top-down or bottom-up effects account for the relationship between life satisfaction and domain satisfaction (i.e., housing satisfaction in this study) for the following reasons: first, a variable can be used as both an independent and a dependent variable, as described later in the hybrid top-down-bottom-up model, whereas a variable is always a dependent variable in multilevel models. Further, this model permits researchers to test for causal relationships between latent factors. Finally, the use of moving as an objective life event results in a higher rate of change in domain satisfaction during the study period, unlike the results of previous studies (cf., bottom-up vs. top-down theories of life satisfaction). It is difficult to find bottom-up effects without including a life event during the study period, because most people's lives are relatively stable over periods of years (Schimmack, Krause, Wagner, & Schupp, 2010).

Figure 2 shows the results regarding average trajectories of housing satisfaction and life

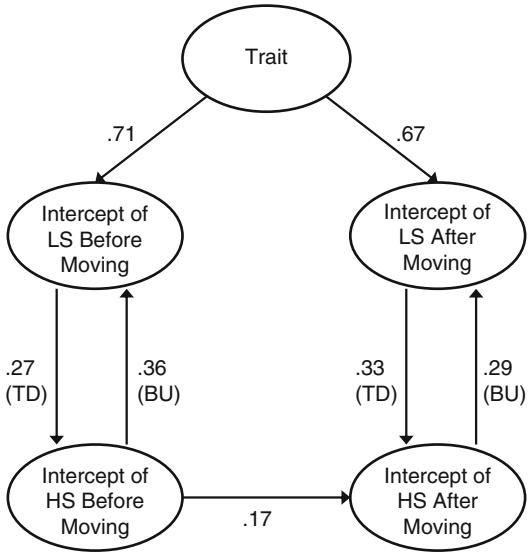


Living Conditions and Well-Being Using German Socio-Economic Panel, Fig. 2 Estimated average trajectories of housing satisfaction and life satisfaction from 5 years before moving to 5 years after moving and correlation coefficients between satisfaction values 5 years before moving and 5 years after moving (This figure is from Nakazato et al. (2011) with modification)

satisfaction and individual stability and change in satisfaction levels during the period from 5 years before moving to 5 years after moving. Average housing satisfaction significantly decreased year by year before moving and immediately increased after moving. Some of the increase was lasting, because housing satisfaction 5 years after moving (i.e., intercept after moving: $M = 7.79$) was significantly greater than housing satisfaction 5 years before moving (i.e., intercept before moving: $M = 6.87$). This is a moderate- to large-sized difference (effect size $d = .57$). Further, individual stability in housing satisfaction between 5 years before moving and 5 years after moving was relatively low (cf., correlation between intercepts before and after moving: $r = .25$).

In contrast, average life satisfaction showed only small changes due to moving, both in the short term (i.e., from 1 year before moving to the moving year) and in the long term (i.e., from 5 years before moving to 5 years after moving). More precisely, life satisfaction decreased somewhat before moving and increased slightly the year of the move. Life satisfaction again decreased somewhat during the period after moving, and life satisfaction status 5 years after moving (i.e., intercept after moving) was *lower* than life satisfaction status 5 years before moving (i.e., intercept before moving). However, this long-term effect of moving was small (intercept before moving, $M = 7.06$; intercept after moving, $M = 6.82$; effect size, $d = .18$). Further, individual rank order stability of life satisfaction was relatively high (cf., correlation between intercepts before and after moving: $r = .62$). These results mean that improvement of housing environment does not result in lasting change in life satisfaction in both individual and average levels.

Finally, the two growth models for housing satisfaction and life satisfaction were combined to examine the extent to which top-down and bottom-up effects account for the relationship between housing satisfaction and life satisfaction (before moving, $r = .57$; after moving, $r = .60$). According to the model fit indices, a hybrid top-down-bottom-up model (Fig. 3) was found to fit the data better than did models estimating only top-down effects or bottom-up effects. In this model, housing satisfaction after moving was regressed on housing satisfaction before moving to estimate the stability of housing satisfaction, because the rank order of housing satisfaction



Living Conditions and Well-Being Using German Socio-Economic Panel, Fig. 3 Hybrid top-down-bottom-up model of the correlations among the intercepts of housing satisfaction and life satisfaction before and after moving. (This figure is from Nakazato et al. (2011) with modification.) *Note*. All coefficients are significant based on 99 % confidence intervals. HS and LS indicate housing satisfaction and life satisfaction, respectively. TD and BU illustrate top-down effects and bottom-up effects, respectively

changes through moving. Both life satisfaction before and after moving was modeled to be influenced by a trait because it is likely that an individual's disposition is not influenced by moving and changes in life satisfaction should be mediated by changes in housing satisfaction. This finding shows that correlations between housing satisfaction and life satisfaction both 5 years before moving and 5 years after moving are explained by both top-down and bottom-up effects. The bottom-up effects should produce an increase of 0.25 points in life satisfaction (i.e., 0.92 [observed increase in housing satisfaction] × 0.27 [unstandardized bottom-up effect after moving]). However, in fact, average life satisfaction 5 years after moving was lower by 0.24 points than life satisfaction 5 years before moving. Some other factors, such as costs associated with moving, could explain this inconsistent result (0.49 points discrepancy).

In summary, Nakazato et al. (2011) showed that at the average level moving produced lasting increases in housing satisfaction but no increases in life satisfaction. At the individual level, moving contributed to changes in the rank order of housing satisfaction, whereas moving did not lead to changes in life satisfaction. Further, the correlations between housing satisfaction and life satisfaction both 5 years before moving and 5 years after moving can be explained by both top-down and bottom-up effects.

These findings can be best explained by top-down theory and housing costs theory (cf., Fig. 1). Hedonic adaptation theory does not account for these findings because it predicts temporary increases in housing satisfaction and life satisfaction. Top-down theory accounts for part of the correlation between housing satisfaction and life satisfaction both before and after moving. Housing costs theory can explain the discrepancy between the increases in average life satisfaction assumed to be produced by bottom-up effects, which explain the remaining part of the correlational relationships, and the decreases in average life satisfaction reflected in the actual data. In conclusion, moving has no effects on the average levels of life satisfaction; this phenomenon is not caused by often-cited adaptation effects but by hidden costs of living.

Discussion

In sum, Nakazato et al. (2011) provided the following evidence:

- Improvement in objective housing environment due to moving can increase housing satisfaction in the long term.
- The correlation between life satisfaction and housing satisfaction can be explained by both top-down and bottom-up effects.
- Based on the evidence of bottom-up effects, improvement in living conditions can improve some individuals' life satisfaction, especially if the costs associated with moving are minimal. Accordingly, the absence of effects of moving on life satisfaction does not suggest that living conditions are unconnected with well-being.

One of the most important future research needs is to describe the potential costs that offset the increases in housing satisfaction produced by improvements in housing environment. No decreases were found in average satisfaction in other domains (e.g., household income satisfaction, leisure satisfaction), eliminating these domains as potential cost factors. It is also important to examine which objective characteristics of housing have the strongest long-term effects on well-being. This examination may contribute to individuals who intend to move or remodel their houses and for architects who design houses. Another important issue is to explore the effects that moderate the relationship between moving and well-being (e.g., personality traits, reasons for moving). This can identify individuals who may receive more benefits from moving than others. Future research should also compare the effects of moving on well-being in different countries. For example, the effects could be different in ▶ developing countries with more heterogeneity in living conditions and even in other European countries (cf., living conditions in Europe, Eurostat).

It is also important to collect and examine longitudinal data in monthly intervals or to use the experience-sampling method in order to conduct more elaborate testing on adaptation effects. This is because adaptation effects could occur after the moving date but before the next survey date: life satisfaction and housing satisfaction could change in shorter-than-yearly intervals. Affective measures of well-being should be examined using these methodologies as well, because hedonic adaptation theory originated as a theory of affect. In order to examine adaptation effects due to ▶ social comparison, these methodologies should also incorporate the question of with whom respondents compare their housing. Finally, it is also important to ascertain whether two-intercept two-slope modeling can account for trends in well-being after other life events, including negative ones (e.g., death of a spouse, ▶ unemployment). For example, the author found similar patterns in trends in well-being before and after unemployment (i.e., a decrease in work satisfaction but no change in life satisfaction).

Cross-References

▶ Continuous Time Analysis
▶ Latent Growth Curve Modeling

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Living Conditions in the Arctic

► Arctic Human Development Report (AHDR)

Living Conditions, EU-SILC Community Statistics on Income and Living Conditions

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Definition

The European Union Statistics on Income and Living Conditions (EU-SILC) is an instrument aiming at collecting timely and comparable cross-sectional and longitudinal multidimensional microdata on income, poverty, social exclusion, and living conditions. This instrument is anchored in the European Statistical System (ESS).

Description

Background

The instrument known as European Union Statistics on Income and Living Conditions (EU-SILC) is now the reference source for poverty indicators and is essential for monitoring related Europe 2020 targets adopted by the European Council in June 2010. In particular, the strategy sets Member States and the European Commission the goal of "Promoting social inclusion, in particular through the reduction of poverty, by aiming to lift at least 20 million people out of the risk of poverty and exclusion."

The Europe 2020 headline indicator "population at-risk-of-poverty or social exclusion" combines three sub-indicators based on EU-SILC, namely, the "at-risk-of-poverty rate after social transfers," the "severe material deprivation rate," and "the percent of people living in households with a very low work intensity." The **at-risk-of-poverty rate** is computed on the basis of a cutoff point (60 % of the median) that identifies "income poor" individuals. It is therefore a relative measure and focuses on resources and not on the actual living conditions of individuals. This monetary approach was complemented with a measure of **severe material deprivation** defined as the enforced lack of a combination of items that represent basic living standards in most of EU Member States. The **low work intensity index** captures the extent to which households are exposed to the risk of social exclusion due to their dependence on social transfers and loose attachment to the labor market.

The EU-SILC instrument was devised by the European Commission and the Member States in order to provide statistics and indicators for monitoring poverty and social exclusion. EU-SILC is **a multidimensional instrument** covering income as well as housing, labor, health, demography, education, and material deprivation to enable the multidimensional approach of social exclusion to be studied. It consists of both primary and secondary target variables. The primary target variables relate to either household or individual (for persons aged 16 and more) information and are collected every year. The secondary target variables are introduced every 4 years or less frequently only in the cross-sectional component in the form of ad hoc modules:

- 2005: Intergenerational transmission of poverty
- 2006: Social participation
- 2007: Housing conditions
- 2008: Overindebtedness and financial exclusion
- 2009: Material deprivation
- 2010: Intra-household sharing of resources
- 2011: Intergenerational transmission of disadvantages
- 2012: Housing conditions
- 2013: Well-being
- 2014: Social participation

Recent initiatives highlighted the growing importance of new indicators and statistical surveillance tools that go beyond conventional economic measures. One of the key improvements foreseen in the coming years is finding

appropriate measures of **quality of life**. This raised interest within the European Statistical System (ESS) for a possible extension of EU-SILC towards a more comprehensive coverage of quality of life (QoL) dimensions. In 2010, the Directors-General of the EU Statistical Institutes recognized the importance of high-quality data about people's quality of life and pointed out that **EU-SILC** should be developed as a core instrument for measuring quality of life across Europe (Sofia Memorandum, 2010).

Quality of Life: Towards an Established Framework of Indicators at EU Level

The measurement of quality of life (QoL) and well-being has recently attracted substantial political attention in the European Union Member States and beyond. In particular, the "GDP and beyond" European Commission communication and the Stiglitz-Sen-Fitoussi commission report (September 2009) raised awareness about the need to review and update the current system of statistics in order to address new societal challenges and to support policy-making.

The response from the ESS was to create in February 2010 the Sponsorship Group on "Measuring Progress, Well-being and Sustainable Development (see Final report of the the Sponsorship Group on Measuring Progress, Well-being and Sustainable Development, 2011)." While the overall group tackled different aspects and overarching issues, a specific task force was charged with developing concrete proposals on the development of new statistics and indicators in the area of QoL. The recommended lines of action build on some general principles set out by the Stiglitz report:

First of all, quality of life is conceptualized as a broad concept that encompasses a "**range of features** in people's lives that are important either intrinsically, as objective expressions of a good life, or instrumentally to achieve valuable subjective states or other objective goals." This implies that statistics will not provide a single summary measure of quality of life but a set of indicators that capture several dimensions:

- Material living conditions (income, wealth, and consumption)
- Productive and valued activities (including work)
- Health
- Education
- Leisure and social interactions
- Economic and physical security
- Natural and living environment
- Governance and basic rights
  - Overall experience of life

Secondly, there is a broad agreement from the statistical community that QoL measurements need to focus on the individual level in order to allow the comprehensive analysis of inequalities and different groups.

Thirdly, surveys should be designed to enable the analysis of **links across dimensions** and **the identification of multiple disadvantaged subgroups**. The Europe 2020 poverty target – people at-risk-of-poverty or social exclusion – sets out an example of such subpopulations disadvantaged in several domains.

These demands require both a comprehensive and integrated set of indicators in which ideally all dimensions should be captured by a single statistical instrument. In practice, such an instrument does not currently exist in the European Union. Nevertheless, through its crosscutting nature, EU-SILC provides already statistics on several aspects deemed relevant for the measurement of quality of life. Therefore, EU-SILC is an essential pillar of the strategy delineated by the task force in order to address statistical gaps in the current system of social surveys. The potential contribution from EU-SILC is two folded:

1. Following the recommendations of the task force, EU-SILC should be developed through two different actions in order to better cover current gaps in the information available on QoL within the ESS based on:
   - Inclusion in the core (yearly) EU-SILC of some essential variables related to the quality of life in general, e.g. overall experience with life
   - Inclusion of topics in the EU-SILC annual modules in order to address specific dimensions of quality of life, not currently

covered within the ESS, such as subjective well-being, leisure and social participation, governance and basic rights, or environmental conditions

Complementary sources (e.g., Labour Force Survey, Household Budget Survey, Time Use Survey, Health Interview Survey) will need to be considered to ensure a comprehensive coverage of all relevant aspects of people's life. Moreover, in the short term, data gaps could be filled by non-official European or national sources provided that their quality level is clearly indicated. This overarching approach would require also efforts to ensure that common subpopulations and reference periods are identified across surveys in order to allow estimating interrelations of dimensions for relevant subgroups.

2. Another priority area identified by the task force is further analytical and methodological work for indicators' development. The "core instrument" approach, centered on EU-SILC, enables in-depth analysis of the structure and relationships between variables at individual level, as well as the assessment of correlations between dimensions. This approach can facilitate the organization of a potentially large amount of relevant factors along a limited number of "homogenous" synthetic indicators for each (sub) dimension with little loss of information. In order to validate the computation of synthetic indicators, their unidimensionality and internal consistency should be assessed through multivariate analysis techniques. Whenever indicators capture distinct but equally relevant subdimensions, a scoreboard should be provided in order to cover more in detail relevant aspects.

The next section provides a provisional framework of indicators based on the ready to use information in EU-SILC along the lines put forward by the task force. For a comprehensive view on QoL, EU-SILC indicators should be complemented with indicators from other sources that cover in-depth specific areas (e.g., labor conditions in LFS). In this context, particular attention should be given to enhance the potential for complementary use of these data sources through analysis of common subpopulations and data integration techniques.

A Comparative View of QoL Based on EU-SILC

In this section, we provide a snapshot of QoL within EU, based on a comparative analysis of the negative scores accumulated by vulnerable subpopulations. The proposed set of QoL indicators (see Table 1) based on EU-SILC encompasses both well-grounded indicators (e.g., the Europe 2020 indicators) and preliminary measures that could provide a more comprehensive picture based on the ready to use data. Most of the indicators in SILC are related to the material living conditions and relevant individual characteristics such as health status, education, and labor. We currently lack information on aspects such as subjective assessments of people on their own life social aspects or participation into society.

In thinking how to provide a workable framework of indicators, some methodological choices were adopted:

- To take the individual as the fundamental unit of analysis. This enables us to link individual scores between and within dimensions and identify multiple disadvantaged subgroups.
- To cover to the extent possible the different domains in the framework identified by the task force.
- To reduce complexity and to compute, to the extent possible, one synthetic indicator for each quality of life (sub)dimension. The internal consistency of indicators was assessed through multivariate analysis techniques (correlations, Cronbach's alpha, correspondence/factor analysis).
- To include indicators that are relatively up to date so we excluded potentially relevant information from previous ad hoc modules.
- To focus on the share of people that accumulate deprivations rather than average indexes that can hide heterogeneity within the population. We built binary micro-indexes that aim

Living Conditions, EU-SILC Community Statistics on Income and Living Conditions, Table 1 List indicators of QoL

Dimension		Variables	Indicators	Definition
1. Material living conditions	Monetary poverty	Income variables	At-risk-of-poverty rate after social transfers	Share of persons with an equivalized disposable income below the risk-of-poverty threshold, which is set at 60 % of the national median equivalized disposable income after social transfers
	Nonmonetary poverty	1. Arrears on mortgage or rent payments, utility bills, hire purchase installments, or other loan payments	Severe material deprivation	Share of population with an enforced lack of at least four out of nine material deprivation items in the "economic strain and durables" dimension
		2. Capacity to afford paying for 1 week's annual holiday away from home		
		3. Capacity to afford a meal with meat, chicken, fish (or vegetarian equivalent) every second day		
		4. Capacity to face unexpected financial expenses (set amount corresponding to the monthly national at-risk-of-poverty threshold of the previous year)		
		5. Household cannot afford a telephone (including mobile phone)		
		6. Household cannot afford a color TV		
		7. Household cannot afford a washing machine		
		8. Household cannot afford a car		
		9. Ability of the household to pay for keeping its home adequately warm		
	Housing conditions	Overcrowded	Severe housing deprivation rate	Share of the population living in a dwelling which is considered to be overcrowded and with at least one of the following three housing situations:
		Leaking roof, dump walls, rot in window frames		(1) a leaking roof or damp walls, floors, and foundations or rot in window frames or floor (2) neither a bath nor a shower nor an indoor flushing toilet (3) too dark
		Lack of an indoor flushing toilet		
		Lack of bath or shower in dwelling		
		Too dark		
	Liabilities		Housing cost overburden	Share of the population living in a household where the total housing costs (net of housing allowances) represent more than 40 % of the total

(*continued*)

Living Conditions, EU-SILC Community Statistics on Income and Living Conditions, Table 1 (continued)

Dimension		Variables	Indicators	Definition
				disposable household income (net of housing allowances)
2. Productive and valued activities (work)	Access to labor market	Labor variables for income reference period for all household members	Low work intensity	Share of people living in households where adults work less than 20 % of their potential during the income reference year
	Quality of employment	Activity status	Constrained part time	Share of people at work, working less than 30 h because he couldn't find full-time job
		Status in employment		
		Type of contract		
		Number of hours worked		
		At-risk-of-poverty	Temporary job	Share of employees with temporary contract
			Long working hours	Share of people at work, working more than 50 h
			In work poverty	Share of persons who are at work and have an equivalized disposable income below the risk-of-poverty threshold, which is set at 60 % of the national median equivalized disposable income (after social transfers)
3. Health	Health conditions	– Self-perceived health (ECHI n°33)	Health problems	Share of people having at least one health problem (bad self-declared health status, self-reported chronic illness, long-term activity limitations)
		– Self-reported chronic morbidity (long-standing illness – ECHI n°34)		
		– Long-term activity limitations (2 indicators: 15+, 65+) (ECHI n°35)		
	Access to healthcare	Self-declared unmet needs for medical examination or treatment	Lack of access to healthcare	Share of people having unmet needs for medical care (medical examination or dental treatment) for the following three reasons: financial barriers + waiting times + too far to travel
		Main reason for unmet needs for medical examination or treatment		
		Main reason for unmet needs (financial barriers + waiting times + too far to travel)		
		Main reason for unmet needs for dental examination or treatment		
4. Education		Highest ISCED level attained	Low educational attainment	Share of people that have at most lower secondary school and are not currently in formal education
		Current formal training		
5. Leisure and social interactions				

(*continued*)

Living Conditions, EU-SILC Community Statistics on Income and Living Conditions, Table 1 (continued)

Dimension		Variables	Indicators	Definition
6. Insecurity	Economic insecurity	Financial burden with total housing cost	Economic insecurity	Share of people either with financial difficulties (make ends meet, financial burden) or perceived future vulnerability (unexpected expenses)
		Financial burden of the repayment of debts		
		Make ends meet		
		Unexpected expenses		
	Physical insecurity	Problems with crime, violence, and vandalism in the area	Physical insecurity	Share of people worried about crime, violence, and vandalism in the area
7. Governance and basic rights				
8. Natural and living environment		Problems with noise from neighbors	**Environmental deprivation**	Share of people with at least one deprivation item
		Problems with pollution and grime and environmental problems		
9. Overall experience of life				

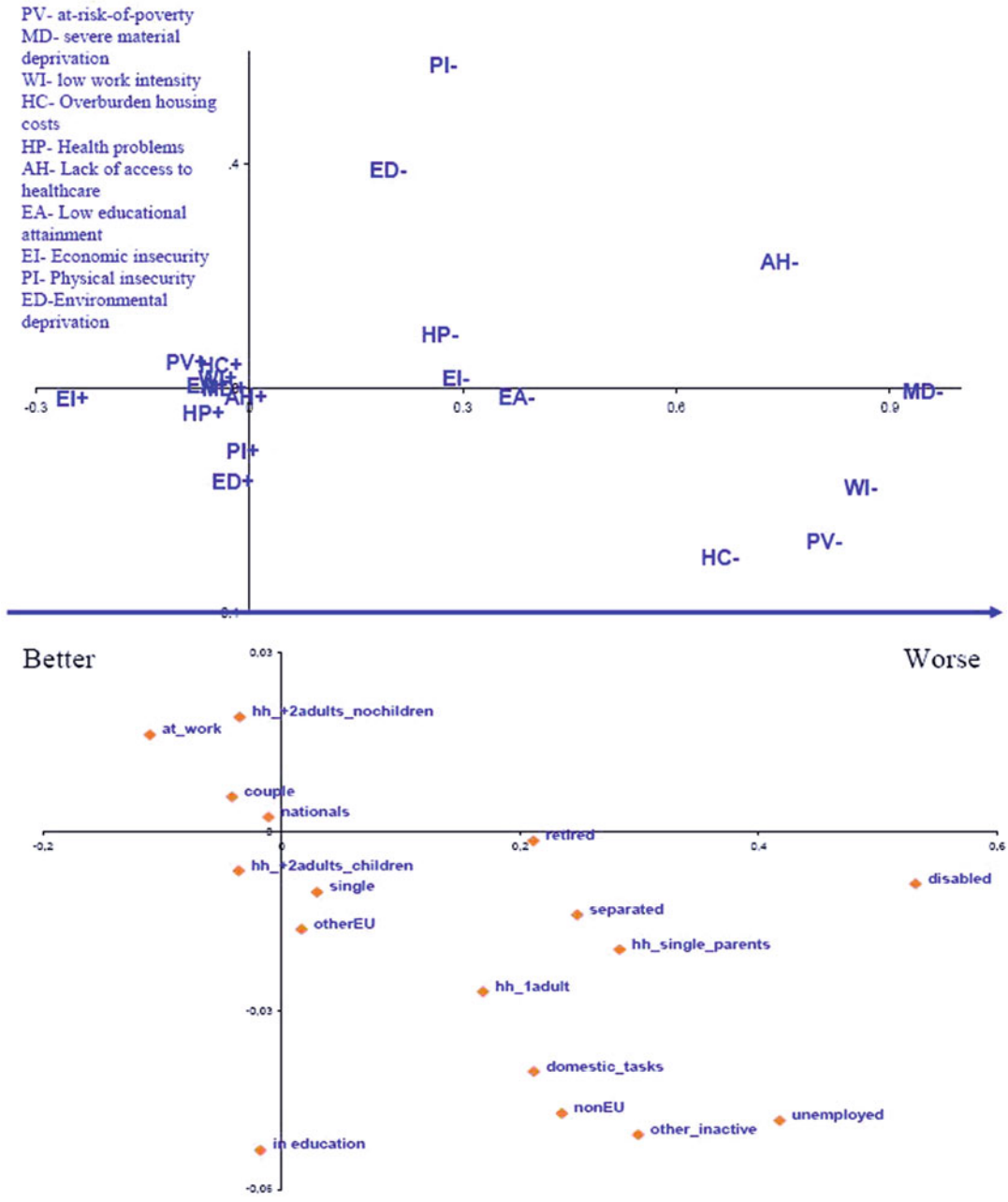
to discriminate between good and bad conditions based on a benchmark value.

Taking an integrative approach, the analysis assesses the links between various quality of life domains for each person. Therefore, we can identify multiple disadvantaged subgroups and the "deficit" they accumulate in different domains. Quality of life indicators can be related both to individual and household characteristics. While quality of life might depend do a large extent to individual characteristics, several others (living standard, environment aspects) are likely to be common across household members. Therefore, we assess the accumulation of deprivations for several relevant groups delimitated according to a range of sociodemographic characteristics, such as labor and marital status, across generations, as well as in relation to specific household compositions.

Another aspect to be considered is that the comparative analysis of a plurality of groups needs to take into account both the availability and the relevance of particular indicators. Education might be particularly relevant for young people; access to healthcare for the elderly and quality of employment relate to the particular situation of people at work. Therefore, when comparing subpopulations we take into account different taxonomies of indicators for particular groups.

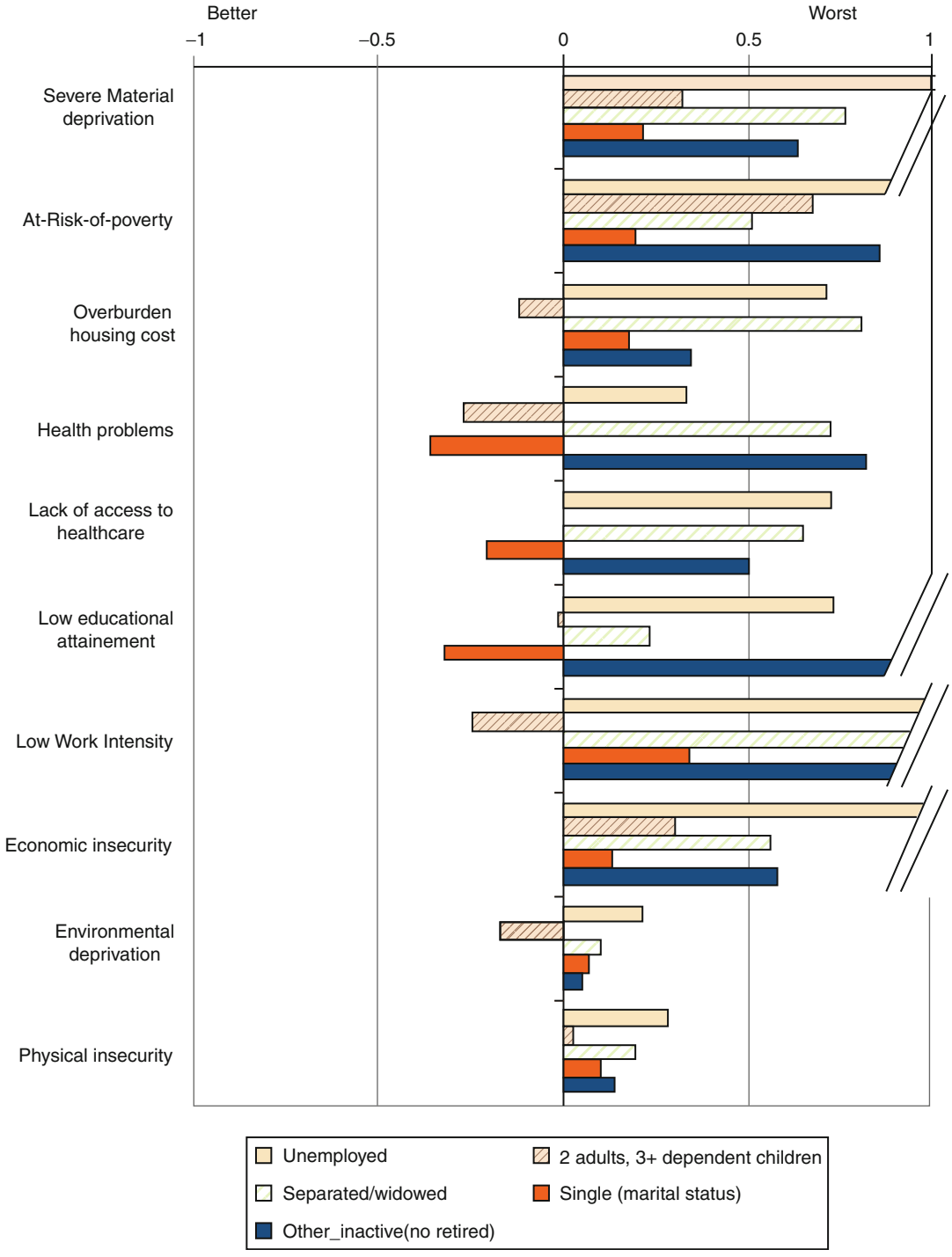
In order to be comprehensive and include a wide range of indicators (e.g., including low work intensity, labor-related information), the first part of the analysis focuses on the population 18–59. Moreover, this approach allows us also to control for the age effect, when comparing QoL indicators for various groups. For example, health conditions are highly related to age, and therefore, analysis of health for different groups might reflect demographic differences.

First of all, based on a wide range of individual level information, we analyze the extent to which disadvantages tend to cluster. Figure 1 highlights the results of the multiple correspondence analyses for our binary indexes. The first dimension explains more than 40 % of the inertia, and we can observe a tendency for the negative scores to cumulate on the left, while the positive ones group on the right. The second dimension captures aspects related to the environment and physical safety and is less related to the other indexes. When we plot on the two axes the

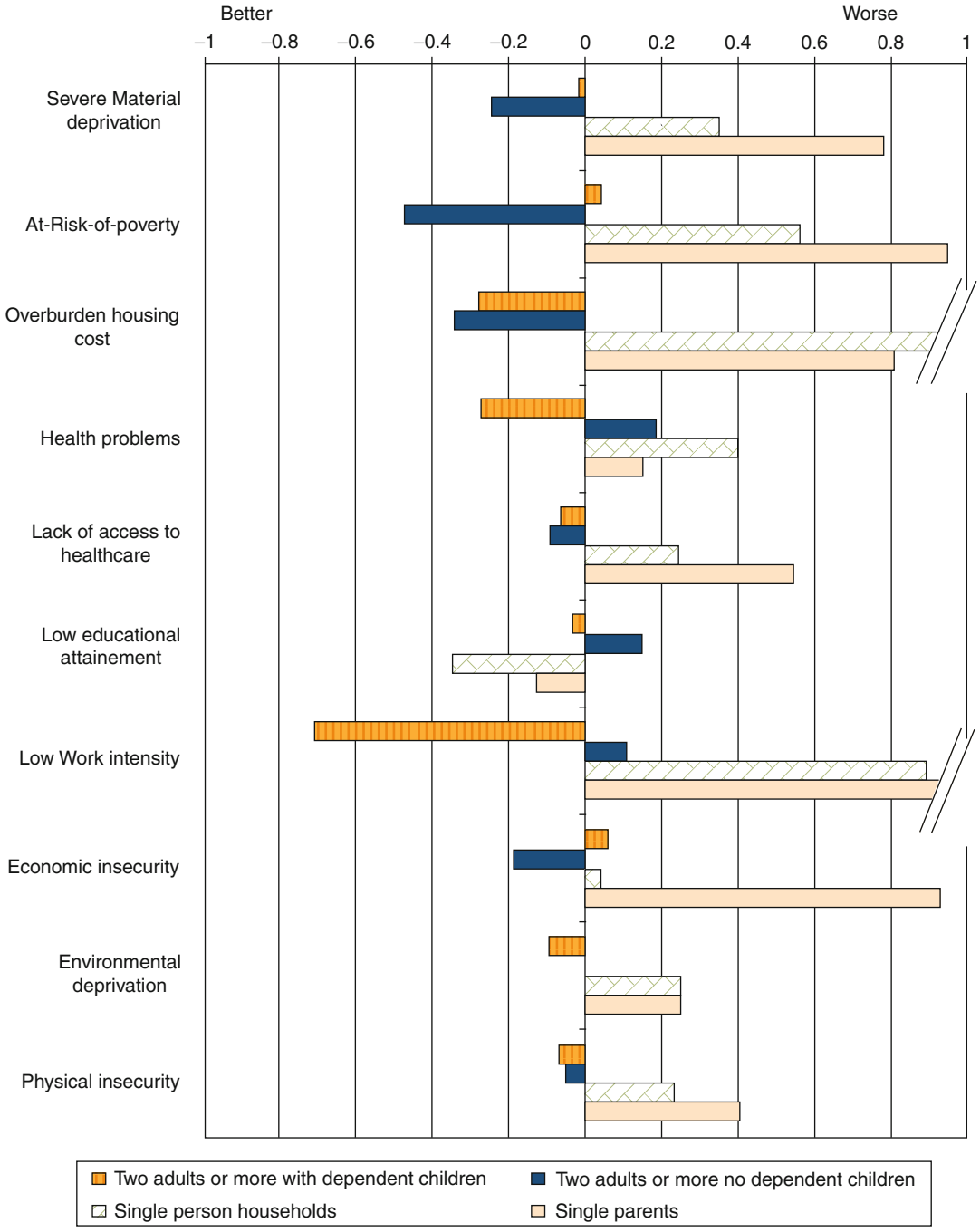


Living Conditions, EU-SILC Community Statistics on Income and Living Conditions, Fig. 1 Multiple correspondence analysis QoL indexes and disadvantaged subpopulations, Eu27

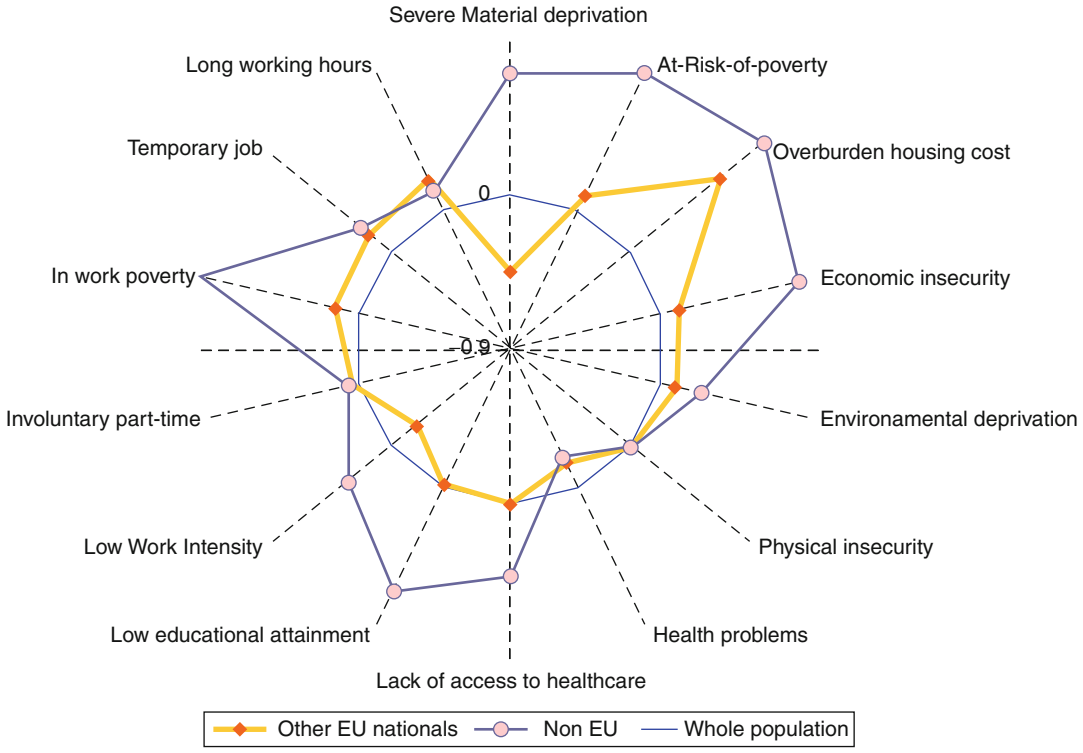
various subpopulations, we can identify those that tend to have a better/worse QoL. The subpopulations are delimitated on the basis of citizenship (nationals, other EU, non-EU), marital status (single, separated), activity status (at work, disabled, in education, or retired), and household type (single parents, people living in household with 2+ adults and with children/no children, people living alone). Single parents, inactive people (disabled people, domestic



Living Conditions, EU-SILC Community Statistics on Income and Living Conditions, Fig. 2 Log odds ratio for the groups at risk



Living Conditions, EU-SILC Community Statistics on Income and Living Conditions, Fig. 3 Differences in the quality of life indicators by household type, EU27 (log of the odds ratio for the different groups in comparison with the population)



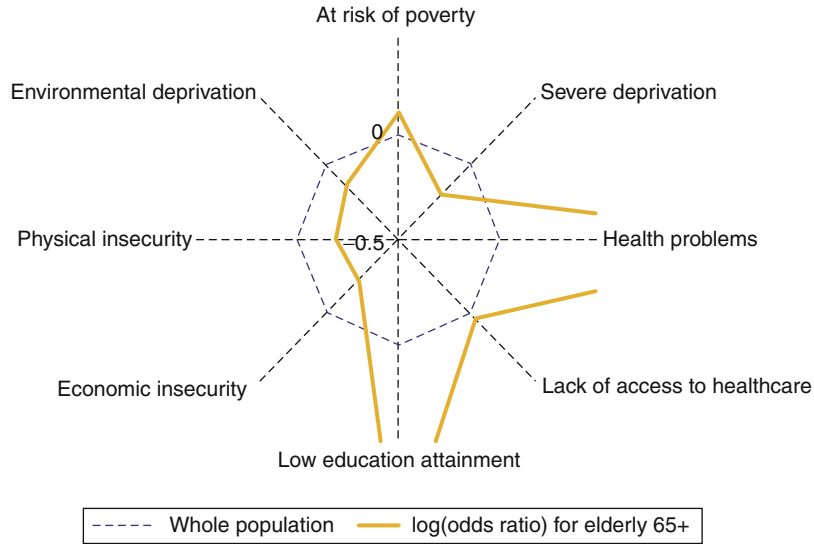
Living Conditions, EU-SILC Community Statistics on Income and Living Conditions, Fig. 4 Differences in the quality of life indicators for migrants, EU27 (log of the odds ratio for the migrants in comparison with the whole population) (Source Silc 2009)

tasks), unemployed, separated or widowed people, and migrants are some of the vulnerable subpopulations identified.

In Fig. 2, we can see for some of the groups at risk the degree to which they have higher chances of being deprived in various domains (compared to the whole population).

Further results are provided for subgroups delineated by household type and for specific groups such as nonnationals. People that live alone and single parents are two subgroups with consistent "higher risk" of being deprived across several domains (see Fig. 3). When analyzing migrants (nonnationals of the country of residence), the results show significant differences between other EU nationals and non-EU nationals (see Fig. 4). The latter are more likely to be deprived in several domains including the material living conditions aspects, access to healthcare, and work intensity. We computed on the basis of SILC also indicators on quality of employment, which are based on the population at work. These indicators need to be analyzed with caution as the reference source for these indicators is LFS. However, the joint analysis of various indicators from the same source enabled us to analyze "overlaps of disadvantages." For example, we can provide figures on the indicator "in work poverty" for different subgroups. The results show that non-EU nationals at work have much higher chances to be "income poor" than the rest of the population at work.

Finally, we provide an overview of the QoL for the elderly in comparison with the whole population (Fig. 5). The taxonomy of indicators excludes from the analysis irrelevant indicators for this group, such as low work intensity or quality of employment. Overall, for EU27, the health problems and low education dimensions are worse for the elderly. One can also see deterioration with respect to the at-risk-of-poverty and access to healthcare.



Living Conditions, EU-SILC Community Statistics on Income and Living Conditions, Fig. 5 Differences in the quality of life indicators for the elderly, EU27 (log of the odds ratio of the elderly in comparison with the whole population)

Overall, the results indicate that disadvantages tend to overlap for several groups "at risk." On this line of analysis, a single source and an integrative approach are valuable for assessing inequalities and capturing the most vulnerable subgroups which tend to cumulate bad scores in various QoL dimensions. However, the analysis provides a partial overview. These preliminary results are based on a limited set of indicators and on certain methodological choices. Moreover, the analysis focused on a snapshot on QoL at EU level without illustrating the different situations of these subpopulations among countries.

Next Steps

Further steps need to be undertaken in order to provide a coherent set of validated quality of life indicators. First of all, in areas where available indicators remain deficient, further work will need to develop better metrics and recognized statistical standards (e.g., economic insecurity, environment, productive activities). Secondly, further empirical work should validate the computation of synthetic indicators, the aggregation methods used, and the thresholds applied. Thirdly, the recent focus on subjective measures emphasized a series of problems and biases that affect the reliability of subjective concepts and their comparability across individuals and countries: adaptation that makes perceptions "immune to real-life conditions," expectations as anchoring points, memory bias, and mood in the moment of the interview. These aspects need to be tackled, and focus should be given to the joint analysis of objective and subjective measures. Finally, the development of indicators needs to account for the different constraints that hamper comparability across groups and countries and allow for different taxonomies across subpopulations.

Cross-References

- ▶ Deprivation
- ▶ Risk of Poverty

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Living Conditions, Swedish Surveys

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Synonyms

Level of learning surveys in Sweden; Swedish level-of-living surveys (sw: levnadsnivåundersökningar); Swedish surveys of living conditions; ULF surveys (sw: undersökningar av levnadsförhållanden)

Definition

The official Swedish social indicator program (ULF) conducted by Statistics Sweden 1974–2006 is one of the oldest and best funded programs. In particular, I would like to emphasize the considerable advantages of:

- *Standardization*: annual large surveys running over more than three decades, a large and standardized system of social indicators measured and reporter by a fixed series of repeated social reports.
- The ULF system covers *13 social domains*, including education, employment, working conditions, income, material living standards, housing, transports, leisure, social networks, political resources, victimization, health, and social mobility.
- *The value of data integration*: annual standardized comprehensive social surveys, simultaneous measurement of all domains, and targeted policy-oriented special surveys.
- *Flexibility* to serve the public debate and policy making as well as general social research.
- *Focus on objective measures*.
- The uses of a *combined cross-sectional and longitudinal sample design over 30 years*.
- A diversified social report system combining general social reports, detailed domain reports, reports on disadvantaged groups, policy analyses, and a periodical journal.
- *Long-term mandate and long-term public funding*: the institutionalization and preservation of a standardized, diversified, and flexible system of social reporting.

The Swedish social indicator program is presented in detail in Vogel (2002b).

Statistics Sweden was given the 2001 Reward for the Betterment of Human Condition, issued by ISQOLS (the International Society for Quality of Life Studies).

Description

Background of Swedish Social Indicator Work

The general design of the ULF system has to be understood from the political background: the rapid expansion of the Swedish welfare state. Social indicator work started in Sweden in the late 1960s with a special commission on issues of low income and social exclusion, which presented a series of reports around 1969–1970, based on a first general social survey ("level-of-living" survey). The 1960s and 1970s were a period of rapid expansion of the Swedish welfare state. The Low Income Commission was programmed to direct further advances of the welfare state. The systematic approach in the tradition of the early social indicator movement, the comprehensiveness of its presentation, and the discovery of islands of poverty and social exclusion amidst of what was believed to be an advanced welfare state echoed in the public debate. Consequently, there was a strong interest in regular monitoring of living conditions and a strong commitment to public funding.

In 1969 Statistics Sweden started its preparation for a regular social indicator program based on large-scale surveys combined with administrative register data, expanding the experience of the Low Income Commission and its first level-of-living survey. The first annual survey in this series started in 1974 (ULF "surveys of living conditions"), and annual social reporting began in 1975. The Social Welfare Analysis Program at Statistics Sweden soon developed as the backbone of official social statistics in a wider sense, aside with the census, labor force surveys,

consumer surveys, and special income distribution surveys.

Basics of the Swedish ULF Survey System

The *Swedish surveys of living conditions* (ULF) have been conducted by Statistics Sweden annually since 1974. ULF developed to one of most extensive information systems in the world in this field, both in terms of the dimensions of the data material (300,000 interviews 1974–2006) and in terms of the variable quantity (700 variables). The data collection is based on personal interviews and additional public register data.

The Swedish ULF system comprises *a standardized set of 125 social indicators* within *13 social domains* (the core module) and *600 additional indicators and background variables*. The sample design is mixed cross-sectional and longitudinal; the *annual sample size is about 7,000*.

The Swedish reporting system is standardized since 1975 and produces *four types of reports*, including:

1. General social reports
2. A series of domain reports
3. A series of special focus reports on disadvantaged groups
4. Special policy studies (1975–2006: 110 titles)
5. A periodic journal

Since 1971 a series of 10 *advisory user boards* (covering 13 life domains), in total including some 100 active members, dominated researchers and officials in planning, were involved in the development of the Swedish system. This strategy paid off in the successful institutionalization and survival of a large and regularly funded survey and reporting system over 32 years. During this period ULF was expanded from a fixed general social survey towards *an integrated survey system*, including a fixed set of 125 social indicators (the core module) and a fixed series of satellite domain modules (health survey, victimization survey, housing survey, etc.), as well as irregular focus research projects included in the survey system. All databases are available to research institutions as well for secondary analysis Vogel (2002a).

Integration and Flexibility

From the very beginning it was obvious that a standardized single general survey would be insufficient to respond to the divergent user needs of the administration and from social research, as well as from the perspective of the social statistics system in general and from social reporting in particular. The *simultaneous measurement* of large volumes of indicators and rich background information were given priority over large sample size, in order to give *maximum flexibility* for regular social reporting as well as policy analysis and general social research. The survey system was also perceived as a flexible platform for extensions incorporating issues earlier covered by special surveys, for follow-up studies, additional focus groups, and as a sampling frame for further studies.

Hence, the general design is rather complex, but still flexible. The ULF surveys of living conditions encompass for each year a *core module* including a general measurement of some *125 social indicators* within 13 life domains, plus a large number of classification variables for distributive analysis. To this are added *in-depth indicator modules* within four groups of domains (themes concerning labor market issues, health/care, physical environment, and social relations). These (additional) in-depth programs were changed every second year and thus repeated over an 8-year cycle. In addition to the annual collection of 125 social indicators by personal interview, a large set of variables are collected from various *administrative registers*. The *modular design* thus provides data bases with close to 14,000 observations collected over a 2-year period. The main part of the reporting is an account of social change over an 8-year period, based on 28,000 observations (years 1 and 2 compared with years 9 and 10), which allows rather detailed disaggregations for trend analysis. About half of these observations (appr. 12,000 cases) form a panel reinterviewed every 8 years. Hence, there is life history data available over up to three decades.

The integrated ULF survey system thus covered much of the needs for special studies within the various domains. This connection between

variables (domains, indicators, classificatory variables) by simultaneous measurement is one of the great advantages of the Swedish system, creating flexibility in analysis and reporting.

The third element of the Swedish surveys is flexible additions included in the system for 1 or 2 years, where the detailed welfare measurement is requested as valuable background information for *special policy analyses* and *special research projects*. Some examples of studies incorporated in the survey system are modules on consensual poverty, public opinion on welfare state provisions, living conditions and care of the elderly, a retrospective module on life history data concerning family formation and labor market participation, and perceived health effects of working conditions.

The Conceptualization of Social Indicators

In the Swedish tradition with its strong orientation towards social planning, social indicators are primarily designed to influence political action. This places *objective* (or descriptive) indicators of living conditions rather than *subjective* (or evaluative) indicators at the center of interest (Johansson, 1983).

Parallel with *the "objective" level-of-living approach*, a competing tradition developed, usually referred to as *quality of life approach*, based on subjective indicators derived from surveys of individual perceptions, emotions, satisfactions, and welfare demands. This tradition notes discrepancies between "objective" and "subjective" indicators, e.g., that those who have most are often least satisfied, and vice versa, and argues that objective indicators are insufficient. Instead, a combination of objective and subjective measurements is recommended.

The problem with subjective indicators is, from a *planning perspective dominating in the Nordic countries*, that they tend to measure the social definition and control of aspirations. Since planning and redistribution should be based on objective conditions, objective indicators predominate in Swedish surveys and social research. The principle is to give priority to objective measurement, but adding a limited set of additional subjective indicators. The volume is a matter of resource allocation and the perceived value of the information. There is strong agreement between researchers, planning staff, and Statistics Sweden on this principle.

Social Reporting

The following types of social reports are published regularly:

General social reports: the yearly Swedish surveys of living conditions have been used for general social reports containing trend analyses of living conditions by systematic comparisons of a large set of population groups, defined by social class, age, sex, family types, regions, immigrants, and disadvantaged groups defined by social indicators (income, poverty, job status, health status, etc.). These reports are based on the set of 125 social indicators covering the complete range of social domains (Vogel and Häll, 1997). The data underlying the reports are appr. 300,000 interviews collected in 1975–2005.

Domain reports: by utilizing the modular design of the survey (in-depth modules appearing for 2 years in an 8-year cycle), a standardized series of ten detailed domain reports are published in each 8-year period. In these reports, time series analyses utilize all surveys since 1975 for the main social indicators and data of the in-depth programs for complementary indicators.

Reports of the situation of selected vulnerable groups: separate systematic analyses of the level of living within all domains for specified, often relatively small target groups. For example, separate Swedish reports deal with disabled persons, immigrants, public allowance recipients, students, the unemployed, farmers, the elderly, young people, manual workers, women, etc. The Swedish reports often use coordinated data collected during a series of 5–8 years to build up large sample sizes (n = 20,000–40,000).

In addition, with special funding, a number of *policy evaluations* have been published in the series.

Sweden like several other countries, including Denmark, Norway, Finland, and Germany, publishes a *journal on social indicators and social reporting* for a general audience.

In addition to the official report series, there is a large volume of other publications (reports, articles) issued by general social research, by ministries and other public institutions, and by unions and other organizations, based on databases and/or analyses delivered by Statistics Sweden. All databases are available to research institutions as well (in anonymized form).

Comparative Social Reporting

The ULF surveys have also been used in comparative social reporting covering OECD member states (linked with the OECD Comprehensive Survey of the 1970s), in the Nordic countries (see Vogel, 1991, 1998) and in the European Union (linked with the ECHP 1995); see Vogel (2002b; 2003).

Since 2006 the ULF system has been integrated with Eurostat Survey of Income and Living Conditions (EU-SILC). The data collection method was changed from personal to telephone interview, and the questionnaire was adjusted to fit SILC definitions, and the indicator modules were heavily reduced. Hence, a new series of measurement began, while the long-term trend analyses bases on ULF (cross-sectional as well as longitudinal) were terminated by these technical changes.

Cross-References

- ▶ European Quality of Life Survey (EQLS)
- ▶ German Welfare Survey
- ▶ Objective Quality of Life
- ▶ Systems of Indicators

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Living Conditions: European Foundation for the Improvement of Living and Working Conditions

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Brief History

The European Foundation for the Improvement of Living and Working Conditions (Eurofound) was founded in 1975 on the basis of Council Regulation (EEC) No. 1365/75. As a body of the European Union (EU), it is financed from the general budget of the European Commission.

Eurofound's role is to provide information, advice, and expertise on living and working conditions, industrial relations, and managing change in Europe, based on comparative information, research, and analysis. Its main target groups are key actors in the field of EU social policy such as employers, EU policy makers, governments, and trade unions. Eurofound's core business is both research and communicating the results of that research. It's main goal is to provide data and expertise for informing and supporting EU policy making on working and living conditions. More specifically, Eurofound is concerned with four social policy domains:

- Measures to stimulate job creation, competitiveness, and employment
- Labor market activation, youth employment, and aging workforce
- Structural reforms in EU member states to ensure long-term sustainability of their public finances and social protection systems
- Reducing poverty and social exclusion

Eurofound's offices are placed at the seventeenth century Loughlingstown House on the southern outskirts of Dublin, Ireland; it also maintains a Brussels Liaison Office. The staff includes some 100 members representing most EU member states. Eurofound is organized in five work units:

- Employment and competitiveness
- Industrial relations and workplace developments
- Living conditions and quality of life
- Surveys and Trends
- Observatories

Activities/Major Accomplishments/Contributions

Eurofound is carrying out three large-scale surveys which are regularly repeated every 4 years.

The **European Working Conditions Survey** (**EWCS**), which started in 1990, is the Foundation's longest running survey and has become an established source of information about working conditions and the quality of work and employment. The EWCS enables the monitoring of long-term trends in working conditions in Europe. Themes covered include employment status, working time and organization, work organization, learning and training, physical and psychosocial risk factors, health and safety, workers' participation, work-life balance, and earnings and financial security.

The ▶ European Quality of Life Survey (**EQLS**), carried out in 2003 and 2007, paints a comprehensive portrait of living conditions in a large number of European countries. It contains a broad range of indicators on different dimensions of quality of life, both objective and subjective. Some EQLS questions were reused in a Special ▶ Eurobarometer on Poverty and Social Exclusion in autumn 2009.

The **European Company Survey** (**ECS**), issued in 2004 and repeated in 2009, investigates workplace practices and how they are negotiated in European companies. It collects information from both managers and employee representatives. The survey was first launched in 2004 as the European Survey on Working Time and Work-Life Balance. It was repeated in 2009 as the European Company Survey, focusing on the issue of flexibility and the quality of social dialogue.

In addition to these surveys, Eurofound maintains other monitoring tools:

- The European Industrial Relations Observatory (EIRO)
- The European Working Conditions Observatory (EWCO)
- The European Monitoring Centre on Change (EMCC)
- The European Restructuring Monitor (ERM)

Cross-References

▶ Eurobarometer
▶ European Quality of Life Survey (EQLS)

Living Systems Assessment

▶ Faceted Action System Theory (FAST)

Local Agenda 21: International Council for Local Environmental Initiatives

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Synonyms

LA21; Local Governments for Sustainability

Definition

Local Agenda 21 (LA21) is a process by which local authorities engage in dialogue with citizens, local organizations, and private enterprises to advance sustainable development. It captures the actions, commitments, and initiatives of Chap. 28, "Local Authorities of Agenda 21," which was the core document produced at the United Nations Conference on Environment and Development (United Nations Department of Economic and Social Affairs [UNDESA], 1992).

ICLEI – Local Governments for Sustainability is an association of over 1,000 local government members from over 84 countries committed to sustainable development and implementation of LA21 processes.

Description

The need for multilevel participation that involves every level of society, from national to regional and local governments and from neighborhoods to households, was firmly recognized with the development of Agenda 21 and the subsequent commitment to support the creation of Local Agenda 21s at the local government level during the Rio Earth summit (UNCED) in 1992 (White, 2001). These commitments were reconfirmed 10 years later at the World Summit on Sustainable Development in Johannesburg where they were linked to the Millennium Development Goals (MDGs). Agenda 21 was the outcome of the United Nations Conference on Environment and Development in Rio de Janeiro in 1992 and serves as the action plan for implementing sustainable development at the global level.

Chapter 28 of Agenda 21 outlines the critical role for local authorities in implementing sustainability at the local level. A focus on sustainable development at the local level explicitly acknowledges that we all live in local communities where our everyday actions contribute to environmental, social, and economic problems, and therefore, it is at the local level that solutions need to be developed through a culture of community involvement, multi-stakeholder participation, and consensus-building so that our cities and communities will be made more sustainable (Otto-Zimmermann, 2002). It is in local communities where the tangible impacts of global social, environmental, and economic trends are felt. Local governments also play a crucial role in sustainable community development as the locally elected, representative, and accountable bodies responsible for local decision-making (Roseland, 2012).

ICLEI – Local Governments for Sustainability (formerly known as the International Council for Local Environmental Initiatives) is an international membership organization established in 1990 by over 200 local governments from 43 countries. Its purpose is to ensure that the important role of local governments in confronting local and global environmental challenges and quality of life issues is recognized in global environmental policy discussions at the United Nations. ICLEI developed LA21 as the participatory planning process to implement Agenda 21 at the local government level. Over 10,000 communities have engaged in the LA21 process and thus committed to addressing sustainability (ICLEI, 2011). LA21 follows a performance-based model with a series of five steps, with particular emphasis on partnership development, citizen participation, and bottom-up planning:

1. Development of a multi-stakeholder and shared decision-making process designed to

be cross-sectoral that will provide guidance for the overall process
2. Assessment of baseline conditions to determine the current state of environment and economic and social conditions and identify key indicators
3. Development of a sustainability vision and objectives and goals regarding where the community wants to be
4. Creation of action plans and priorities designed to achieve intermediate targets
5. Monitoring and review to track progress and hold participants accountable to the long-term objectives and goals

The value of LA21 has been its flexibility to incorporate a diversity of issues and concerns regarding quality of life in diverse communities. The LA21 process has been used to orient planning towards sustainability in contexts of municipal service provision in Ahmedabad, India; transportation and land-use planning in Curitiba, Brazil; integrated resource management in Heidelberg, Germany; planning for resilience in Kobe, Japan; poverty reduction in Johannesburg, South Africa; and intergovernmental cooperation in Vancouver, Canada (ICLEI, 2002a). Each of these examples illustrates how LA21-type processes have addressed a pressing local issue in a cross-sectoral manner and made connections between global and local environmental concerns. LA21 has galvanized support for local quality of life issues in particular places and provided a mechanism to link those issues to national and global scale agendas. Local government planning and policy development worldwide which now includes commitments to sustainability principles and innovative sustainability projects can be found in all corners of the globe. LA21 processes have contributed to making municipal operations more ecologically efficient, raised public awareness about water quality and waste reduction, and contributed to overall "greening" of municipalities (ICLEI, 2002b). They have had less success at challenging underlying processes, structures, and values (such as consumer-driven lifestyle) and more often reflect what critics refer to as the greening of economic growth (Rees, 1995).

Despite the role of LA21 processes in establishing committed responses to sustainability challenges at the local level, the existence of innovative sectoral responses, demonstration projects, and case studies of sustainability, it is fair to say that our cities and communities are becoming less sustainable rather than more so (Bulkeley & Betsill, 2005; Williams, 2009). LA21 processes have struggled to overcome the planning-implementation gap, or the gap between making commitments to sustainability and the everyday actions of individuals and organizations (Dale, 2001; ICLEI,, 2002b; Gahin, Veleva, & Hart, 2003; Parkinson & Roseland, 2002). This gap is multifaceted and consists of both structural and procedural barriers.

From a structural perspective, the implementation of complex and integrated initiatives such as those identified in LA21 processes often involve changes in relationships between participants and shifts in power. The diversity of stakeholders engaged in LA21 processes results in different and competing visions for what a sustainable community means in a particular place. There is an inherent conflict between LA21 processes and principles that focus on collaborative problem solving and participatory approaches to integrated decision-making at the local level, while global economic restructuring processes have placed greater emphasis on the role of economic networks and private sector initiatives (Harvey, 1989), often at the expense of environmental or social concerns (e.g., failure of climate change negotiations in the context of economic recession and international financial system bailout). Governance and decision-making structures within local government institutions and within the broader community have difficulty promoting multi-sectoral and integrated decision-making that is needed to implement local sustainability (van Bueren & ten Heuvelhof, 2005), presenting challenges for civic engagement and social capital development (Dale & Onyx, 2005).

Related to these structural barriers are the procedural challenges associated with effective multi-stakeholder processes (Conroy & Berke, 2004), navigating the complexity of local

sustainability initiatives (Bulkeley, 2006) and building the capacity of local government decision-makers to link short-term problems with long-term sustainability solutions (Evans, Joas, Sundback, & Theobald, 2005). Overcoming the planning-implementation gap requires approaches that acknowledge the interrelationships between structure and process. These barriers are aggravated by the tendency to focus exclusively on the environmental elements of sustainable development instead of building on issues and concerns of quality of life and social justice that promote integrated decision-making (Agyeman, Bullard, & Evans, 2003).

The existence of a LA21-type process in a particular place does not, on its own, resolve the considerable challenges and barriers to sustainability. However, it does provide a common framework by which complex issues related to sustainability can be dealt with at scales from the local to the global. As the organizing partner for the Local Authority Major Group within the United Nations Conference on Sustainable Development, ICLEI is responsible for coordinating input from local authorities into the UN preparatory meetings for Rio 2012. The two themes of Rio 2012 are green economies and global environmental governance. ICLEI is documenting local government processes and responses to the sustainability challenge worldwide (Simpson & Zimmermann, 2013). Drawing on 20 years of experience with LA21, the purpose is to identify local government initiatives that have had success in making their communities more resilient and eco-efficient while greening their economies and to highlight challenges and barriers for further local government action (ICLEI, 2011).

Cross-References

- Agenda 21
- Citizen Participation and Bottom-Up Planning
- Civic Engagement
- Decision Making
- Governance
- Indicators, Quality of Life
- Local Government
- Quality of Life
- Sustainability
- Sustainable Communities Movement
- Sustainable Development

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Local and Regional Development

► Economic Development

Local Communities Evaluation

► Good Neighborhood Index

Local Food Movements (100-Mile Diet)

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Synonyms

Eat local campaigns

Definition

The local food movement in its present iteration has been gathering momentum for more than a decade. Arguably, it came of age with the naming of "locavore" as the word of the year by the Oxford American Dictionary in 2007. According to the Oxford Dictionary a locavore is "a person whose diet consists only or principally of locally grown or produced food." As a reflection of the emergence of locavores, the local food movement has gained popular traction through the work of celebrity chefs and writers such as Mark Bittman, Jamie Oliver, Wayne Roberts, and Michael Pollan on the alternative side and through the deconstruction of the conventional food system through popular films and books (including Schlosser's Fast Food Nation and Food Inc).

In recent years there has been increasing theoretical attention and empirical assessment of various dimensions of local food. The local food movement is tied closely to ► sustainability and can be defined by the relatively more or less socially just, ecologically resilient democratic, participatory and economically robust communities (Blay-Palmer, 2010; Feenstra, 1997; Hinrichs & Lyson, 2008; Marsden & Sonnino, 2012; Levkoe, 2011). The "foodshed," as elaborated by Kloppenberg and his colleagues (1996), attends to multiple aspects of a localized food system including moral economies whereby human needs are considered over economic profit; principles of commensality so that communities foster inclusive social linkages and relationships as well as ecological and environmental stewardship that protects and regenerates; secession where spaces resistant to the mainstream can be created and offer opportunities to "move over" from mainstream to alternative; and finally, that foodsheds have boundaries that are as proximate to the eater as possible.

Description

In actualizing local food movements, there tends to be an emphasis on one of these dimensions over others depending on the context. In some cases, local food is associated with shorter distances between eaters and producers through direct sell venues such as farmers' markets and

community-supported agriculture, where eaters purchase seasonal shares in a farm and are provided with food as available throughout the growing season (Feagan, 2007). These alternative food networks founded on individual, trust-based links are seen to challenge the conventional food system that privileges industrial, large-scale supply chain efficiencies (Goodman, Dupuis, & Goodman, 2011). Others equate local food with reducing "food miles" so the carbon shadow of the food is diminished. These analyses work to determine the relative footprint of food (Peters, Bills, Lembo, Wilkins, & Fick, 2009). Local food movements also have the potential to bring about political change as they can provide an opportunity for a more participatory democracy through what Lyson calls "civic agriculture." This offers a window for citizen engagement through local food relationships (Lyson, 2004). On the social justice side of local food, projects can tackle food security and so focus on ensuring access to sufficient amounts of healthy, culturally appropriate food. Food production and consumption is closely linked to perceptions of quality of life as well as place (Marsden, 2011).

The preoccupation with food deserts as places where food insecurity exists has attracted much attention from academics, public health officials and planners in recent years (Wrigley, Warm, Margetts, & Whelan, 2002). Local food interest also offers openings for new economic relationships to emerge through more inclusive employment (Donald & Blay-Palmer, 2006) and local economic development by retaining more money in local economies (Meter, 2010). While some of these conceptualizations tend to adopt a more polarized approach, some academics encourage us to consider hybrid configurations when thinking about our food as there are no clear lines between the alternative and conventional (Maye, Holloway, & Kneafsey, 2007). Importantly, some scholars caution us to remember that despite the "local turn" in our approach to food, we need to examine our connections to the global food system and recognize we are "tied to many and diverse locals around the world" (Feagan, 2007: 23), and as part of these connections, we have a moral responsibility to people in other places (Morgan, 2010). Others critique the local and provide evidence that it can be used a defensive posture by some communities to erect walls between themselves and "others" (Hinrichs, 2003) and that there is nothing inherently "good" about local (Born & Purcell, 2006).

While recognizing the merit of these considerations, the local food movement has become increasingly important as people begin to redefine what is important to their quality of life. Whether the local food movement can ever tip the system towards greater community and ecological well-being through system transformation or whether it risks being co-opted by economic interests remains to be determined (Kloppenberg, Hendrickson, & Stevenson, 1996).

Cross-References

▶ Health

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Local Government

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Synonyms

County government; Municipality; Township; Village

Definition

Local governments are subnational political and administrative entities most associated with municipal-level governance. They may either consist of locally elected political bodies or may be appointed by provincial and national governments. The primary function of local governments is to provide public goods such as police and fire protection, education, city planning and zoning, and waste collection. Many local governments have also taken a role in the provision of social services and economic development.

Description

Local government can take on a variety of meanings depending on the country in question. Many countries invest most power in national and regional governments, leaving limited powers for local governments. They are often little more than administrative units. In Anglo countries, local governments tend to have relatively more power and autonomy. The United States, for example, is thought to have the most developed notion of local government dating back to the colonial days of local self-government. There are several types of local government in the USA worth discussion.

Most local governments are composed of a council or board of elected citizens. The mayor-council format was most widely employed before the Progressive Era and is still used today in most large cities (Edwards, Lineberry, & Wattenberg, 2006). It may consist of a "weak mayor" model in which the mayor does not possess any executive powers such as the ability to appoint officials or veto council legislation. She is only a councilperson chosen to take on special administrative duties such budget preparation. In the "strong mayor" model on the other hand, the mayor takes on the role of executive complete with veto and appointment powers.

Concerns over corruption led many cities and towns to switch to a manager-council format during and after the Progressive Era in order to increase accountability (Toulmin, 2009). This form of local government consists of elected legislators who retain all legislative powers but appoint a professional manager to perform the

executive functions mentioned above. This format has been extended to some special districts such as school districts and county governments. The idea is that handing power over to a professional manager insulates their decisions from everyday politics. This had led to some innovation in the way local government is run. For example, city managers are increasingly using social indicators to help them make the best decisions (Aristigueta, Cooksy, & Nelson, 2001; Leuenberger, 2009).

Discussion

Local government has been the subject of American debates dating back to De Tocqueville (2003) admiration for the local self-government he found in New England town meetings. During the Progressive Era, urban activists made municipal reform one of the cornerstones of the movement. They sought to rid local government of what they saw as corruption and waste. For decades, economists have been arguing about the "optimal" size and structure of government. Some argue that quality of life is enhanced by large-scale government provision of services, while others argue that people are best served by minimal government intervention. Charles Tiebout (1956) was one of the first economists to tackle the problem of matching people's preferences for particular public goods with government provision of those goods. He argued that local government was the solution. People would sort themselves out by moving to the local jurisdiction which best matched their preferences. If Jorge preferred lower taxes at the cost of fewer services, he could easily move to Town A. If Sheila preferred more services at the cost of higher taxes, she could move next door to Town B. In essence, people "vote with their feet."

This view has been challenged by a number of economists and urban planners who saw several problems with Tiebout's logic. The first was the problem of growing local government expenditure. In many places, the costs of local government services were outpacing the value of their provision. Critics argued that this was because local government lacked appropriate economies of scale. Providing some public goods at the local level was inefficient. For example, what would be the point of several rural towns each having their own fire department which they sparsely use? The cost of fire trucks alone, even assuming they each had a volunteer force, would put a heavy burden on a town of 1,000 residents with a small tax base. The second was the problem of urban sprawl. Local control of zoning laws led to low-density metropolitan areas which pushed people further out into the suburbs. Critics argued suburban sprawl was not only aesthetically displeasing but that it posed significant environmental problems and helped to further racial inequalities. Where Tiebout saw efficient local control, others saw wasteful fragmentation (U.S. Advisory Commission on Intergovernmental Relations, 1987). The solution was consolidation and centralization of government services in regional authorities.

A number of scholars have attempted to measure the effect of local government structure on residents' quality of life despite problems of measuring such an elusive concept (Van Ryzin, 2004). DeHoog, Lowery and Lyons (1990), using county survey data from the United States, explore the effects of individual, city, and jurisdictional level factors on citizen satisfaction. They find evidence that local efficacy, community attachment, and the level and quality of services all have a positive effect on citizen satisfaction, but the evidence on local government fragmentation versus consolidation remained unclear. Scholars from the so-called Bloomington School have not been so surprised by this result. They argued that there is no "one-size-fits-all" answer to local government as much depends on local context. Alternatively, they saw the need for polycentric local governance made up of overlapping jurisdictions which do not lump all service provision together (Aligica & Boettke, 2009). The recent Nobel Prize awarded to Elinor Ostrom for her work in this area highlights the vibrancy of the research program and the need for further exploration.

Cross-References

- ▶ Benchmarking
- ▶ City Competitiveness and Quality of Life
- ▶ Civic Engagement
- ▶ Community Development
- ▶ Confidence in Government
- ▶ Economic Development
- ▶ Educational System
- ▶ Gentrification
- ▶ Governance
- ▶ Government Service Satisfaction
- ▶ Healthy Cities
- ▶ Index of Quality of Regional Development
- ▶ Land-Use Planning
- ▶ Neighborhood
- ▶ Political Participation
- ▶ Public Good(s)
- ▶ Public Spending for Education
- ▶ Regional Quality of Life
- ▶ School Satisfaction
- ▶ Suburbanization
- ▶ Sustainable Communities Movement
- ▶ Urban Areas
- ▶ Urban Life, Quality of
- ▶ World City Development Index: Global Urban Observatory

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Local Governments for Sustainability

▶ Local Agenda 21: International Council for Local Environmental Initiatives

Local Indicators

▶ Defining Well-Being: Local Versus Public Policy Definitions

Local Knowledge

▶ Indigenous Knowledge

Local Means of Well-Being

▶ Defining Well-Being: Local Versus Public Policy Definitions

Local Planning

- ▶ Land-Use Planning
- ▶ Planning, Spatial

Local Progress

▶ Community Economic Development

Local Satisfiers

► Defining Well-Being: Local Versus Public Policy Definitions

Locational Analysis

► Spatial Analysis

Locational Flexibility

► Work, Alternative/Flexible Arrangements

Locomotion and Disabilities

► Mobility Issues for People with Disabilities

Locus of Control

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Definition

The locus of control is an individual generalized belief about where control over life events resides.

Description

The locus of control construct was originally introduced by Julian B. Rotter (1966) who defined locus of control as a generalized belief in internal versus external control of reinforcements that arises from individuals' general expectations. Accordingly, people who generally perceive a causal relationship between their own behavior and rewards are considered as having an internal locus of control and are labeled "internals." Internals view reinforcement as a consequence of their own actions. On the contrary, people who believe that consequences are unrelated to their own actions and behavior are considered as having an external locus of control and are labeled "externals."

Locus of control is considered a relatively stable disposition, or trait, although partially modifiable through experience. More specifically, people whose efforts are properly and repeatedly rewarded are more likely to develop an internal locus of control, whereas people who do not attain good results, despite their efforts, are more likely to become external.

In the early conceptualization provided by Rotter, locus of control is defined as a bipolar dimension, with internality and externality representing two ends of a continuum and most of the people falling between the two poles. Subsequent research suggested that locus of control may be better defined with more than one dimension. More specifically, Hanna Levenson (1973) proposed a multidimensional conceptualization of locus of control with three independent dimensions: internal, powerful others, and chance-based. The latter two dimensions were derived from what Rotter previously defined as external pole of the continuum.

Locus of control has been found to be associated to several factors that play a crucial role both in the individual and interpersonal functioning. A number of studies have shown a strong relationship between locus of control and behavioral self-regulation processes (Bandura, 1997). As external individuals are prone to believe that their behavior and actions will not influence future outcomes, they are less likely to be steadily engaged in pursuing their goals, and they give up more easily in case of obstacles or failures. On the contrary, internal locus of control fosters self-regulation. Internal people believe that hard commitment and hard work would lead to positive future outcomes; as a consequence, they persevere in goal pursuit, even when facing difficulties. Research in the domains of organizational, educational, and health psychology demonstrated

that internal locus of control promotes high achievement and satisfaction, whereas external locus of control is frequently associated with poor performance and poor physical and psychological health.

A recent meta-analysis by Ng, Sorensen, and Eby (2006) showed important relationships between locus of control and several work outcomes. In particular, workers' locus of control is linked to both general and job-related well-being. Internal locus of control is positively associated to ▶ job satisfaction and its specific facets, such as satisfaction with salary, coworkers, supervisors, and promotion. Locus of control is also related to aspects of job commitment, such as the amount of hours worked, as well as to job motivation, task performance, and career success, in terms of salary and job position.

Internal locus of control also promotes higher levels of academic achievement and performance (Findley & Cooper, 1983), both in childhood and adolescence, and it is particularly relevant to healthy versus unhealthy behaviors. In health psychology, health-related locus of control is commonly conceptualized as composed by three independent dimensions: the "internal health-related locus of control" corresponds to the extent to which people believe they are able to control their own health; the "powerful others health-related locus of control" reflects people beliefs that their own health is controlled by other important people (e.g., physicians and nurses); the "chance health-related locus of control" corresponds to people's beliefs that luck, fate, or chance may influence and control their health status. Within this framework, Norman and Bennett (1996) argued that evaluating health-related locus of control in specific domains allows to investigate relationships between ▶ health behavior and locus of control better than measuring a general dimension of locus of control. Using behavior-specific health-related locus of control measures, a number of studies predicted several health-related behaviors, like smoking abstinence (Stuart, Borland, & McMurray, 1994), diabetes management (Bennett-Murphy, Thomson, & Morris, 1997), adherence to medical regimens in hypertension (Stanton, 1987), adjustment to cancer (Watson, Greer, Pruyn, & Van den Borne, 1990), survival after lung transplantation (Burker, Evon, Galanko, & Egan, 2005), and emotional adjustment before and after heart transplantation (Kugler et al., 1994).

Measuring Locus of Control

Rotter's Internal-External Locus of Control Scale (1966) remains one of the most used self-report measures to assess a general (not contextualized) dimension of locus of control. This scale consists of 29 forced-choice pairs, each including one internally oriented statement and one externally oriented statement. A sample pair is "people's misfortunes result from the mistakes they make" versus "many of the unhappy things in people's lives are partly due to bad luck."

Accordingly to the multidimensional conceptualization of locus of control, Levenson (1973) developed a self-report questionnaire to assess three distinct and independent dimensions: internal, powerful others, and chance-based. Each dimension is measured by eight items with a ▶ Likert scale response format.

More recently, many self-report measures have been developed to assess behavior-specific locus of control. These scales, reviewed by Furnham and Steele (1993), included those related to the organizational, educational, and health contexts.

Work-related locus of control is quite commonly measured by Spector's Work Locus of Control Scale (Spector, 1988) that assesses individuals' generalized control beliefs in the work context. The Safety Locus of Control Questionnaire (Jones & Wuebker, 1985) measures the frequency of employee caused accidents, whereas the Career Locus of Control Scale developed by Trice, Haine, and Elliot (1989) is the most frequently used in the job selection process. The Bialer Locus of Control Scale (1961) and the Nowicki-Strickland Locus of Control Scale (1973) have been developed to assess children's locus of control related to the school tasks.

Cross-References

▶ Job Satisfaction
▶ Likert Scale

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Logical Thought

▶ Economic Rationality Assumption

Logistic Regression

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Definition

Logistic regression is a statistical analysis method that constructs a statistical model to describe the relationship between a binary or dichotomous (yes/no type) outcome (dependent or response variable) and a set of independent predictor or explanatory variables.

Description

Regression modeling is a popular and useful approach in statistics that is used to explore and describe the relationship between an outcome or dependent/response variable and a set of independent predictors. Logistic regression is concerned with the special situation in regression modeling, where the outcome is of a binary or dichotomous (yes/no) nature (Hosmer & Lemeshow, 1989). Such outcomes are fairly common in quality of life (QOL) research. For example, Miravitlles et al. (2000) conducted a study to develop and validate two models to estimate the probabilities of frequent exacerbations (more than 1 per year) and admissions for chronic obstructive pulmonary disease (COPD) that can be used in a primary

care setting. In addition, measures of QOL such as the Health Complaints Scale and the Global Mood Scale are frequently dichotomized (often using a median split) to create a binary outcome of "impaired QOL," for which logistic regression would be the appropriate method of statistical analysis (Denollet, Vaes, & Brutsaert, 2000).

Linear regression, where the outcome is continuous, cannot be used for binary outcomes because the probabilistic distribution of a binary or dichotomous variable is very different from that of a continuous variable (e.g., in the former case, the variance is usually a function of the mean, which is not the case for the latter). In addition, modeling a binary outcome entails modeling the probability of that event, which cannot be negative – a restriction that does not apply to linear regression.

The logistic regression model uses a logit link function to model the probability of a binary event. Suppose our binary outcome or "event" is Y, which can only be 0 ("No") or 1 ("Yes"). Then, logistic regression models Pr (Y = 1) = p (suppose) as follows:

$$\log(p/[1-p]) = b0 + b1 * x1 + b2 * x2 + \ldots,$$

where b0 is the average odds for event Y to happen; x1, x2, etc. are independent predictors or covariates; and b1, b2, etc. are the corresponding regression coefficients. Generalizations to this model that incorporate ordinal and categorical outcomes (i.e., more than two groups) are discussed elsewhere (Agresti, 2002).

The logistic regression model presented above is fitted using maximum likelihood estimation, which yields estimated values for the model parameters (b0, b1, b2, etc.) that maximize the probability of obtaining the observed set of data. Model diagnostics can be performed on a fitted logistic regression model using the receiver operator characteristics (ROC) curve and the area under the ROC curve (AUC), which measure how well the fitted model discriminates between events (Y = 1) and nonevents (Y = 0), as well as the Hosmer-Lemeshow goodness-of-fit test, which compares the observed data with that expected under the fitted model. These tools are commonly available in most popular statistical analyses software, including SAS (PROC LOGISTIC), SPSS, STATA, and R.

Interpretation of the regression coefficients from a logistic regression model entails exponentiating these coefficients so that they can be expressed in terms of odds ratios. For example, suppose, in the above equation, Y measures impaired QOL secondary to treatment for coronary heart disease (CHD), with Y = 1 signifying impaired QOL and Y = 0 for unimpaired QOL, x1 measures patient age (in years), and x2 signifies gender (1 = female, 2 = male). Then, exp(b1) is the odds ratio for age, which measures the factor by which the odds for QOL impairment increases per year increase in age. Similarly, exp(b2) measures the factor by which women have increased odds for impaired QOL, compared to men. Note that the odds ratio may be either smaller than 1 (in which case the relevant factor is inversely related to the outcome) or greater than 1 (when the factor is positively related to the outcome). Thus, if exp(b1) exceeds 1, and exp(b2) is less than 1 in our example, that would imply higher rates of impaired QOL in older men.

Cross-References

- ▶ Area Under the Curve (AUC)
- ▶ Binary Response
- ▶ Linear Regression Model
- ▶ Multiple Regression
- ▶ Odds Ratio
- ▶ Ordinal Logistic Regression

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Loglinear Models

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Definition

Loglinear models describe the associations between two or more categorical variables in a statistical model. Loglinear models belong to the family of generalized linear models (GLMs).

Description

Basic Model

Based on publications by L. A. Goodman (e.g., 1971), the loglinear model became the most widely applied statistical model to analyze the associations between two or more categorical variables. Categorical variables that may be of interest in research on quality of life (QOL) are (among others) gender, attribution styles, different preferred activities, different most important domains of life, and different values or personal qualities individuals appreciate. For example, one may want to test if individuals who judge their professional or family lives to be more important (variable A denoted by superscript A, its categories are denoted by subscript i) differ in their most preferred leisure time activities (spending time with their family, with colleagues, or with friends; variable B denoted by superscript B, its categories are denoted by subscript j). Typically, two or more categorical variables are organized in multidimensional frequency tables to reflect their joint frequency distribution. In this case the two-dimensional frequency table with 2 x 3 = 6 cells contains the frequencies how often the different combinations of most important domains of life and most preferred leisure time activities have been named. The general purpose in formulating loglinear models is to reflect the common distribution of the variables of interest. To this end, the frequencies of the multidimensional cross-table are analyzed relying on odds and odds ratios. In the general framework, loglinear models are used to analyze undirected associations, that is, no assumption about independent and dependent variables is made.

Loglinear models can be formulated in two forms: the multiplicative parameterization describes the frequencies as products of parameters relying on odds and odds ratios. In the multiplicative parameterization, a particular expected frequency (e_{ij}) is the product of different τ-parameters. For a two-dimensional frequency table, the saturated model is as follows:

$$e_{ij} = \eta \tau_i^{A} \tau_i^{B} \tau_{ij}^{AB},$$

where (e_{ij}) depicts the expected frequency for the cell combination (ij), for example, family life ($i = 1$) and spending time with the family ($j = 1$). It is a product of the eta- and tau-parameters. The interpretation of the parameters depends on the coding scheme used to identify the model (Agresti, 2002). In the dummy-coding scheme, for example, the τ-parameters reflect the deviations of a specific cell frequency from the cell frequencies in a reference category. In the effect-coding scheme, the τ-parameters reflect the deviations from the average effect. The effect-coding scheme is more widely used than the dummy-coding scheme. However, the parameters of both coding schemes can be transferred into each other. For the effect coding, the following interpretations of the loglinear parameters hold in the saturated model: η depicts the geometric mean of all cell frequencies. It is rather a reflection of sample size (Hagenaars, 1993). The parameter τ_i^{A} for the one-variable effect of $i = 1$ depicts the ratio of the geometric mean of all cells sharing the same index i to the overall effect,

for example, the geometric mean of the cells for individuals judging family life as most important is $\tau_i{}^A$ times higher than expected based on the overall geometric mean. The partial odd of preferring family life over professional life is thus $\tau_1{}^A/\tau_2{}^A$. The two-variable effect ($\tau_{ij}{}^{AB}$) depicts to which degree cell frequencies deviate from the expectations given the overall effect and the one-variable effects. The parameters $\tau_{11}{}^{AB}$, for example, depict the ratio to which the combination of judging family life as most important and spending time with the family as most preferred activity is more or less often found than expected on the one-variable effects. Values larger than 1 indicate that a given category or combination of categories is expected more often. Values below 1 indicate the opposite. Transforming the parameters of the multiplicative parameterization by taking the natural logarithm (ln) results in the additive parameterization:

$$\begin{aligned}\ln(e_{ij}) &= \ln(\eta) + \ln(\tau_i{}^A) + \ln(\tau_i{}^B) + \ln(\tau_{ij}{}^{AB}) \\ &= g_{ij} = \theta + \lambda_i{}^A + \lambda_i{}^B + \lambda_{ij}{}^{AB}.\end{aligned}$$

For the additive parameterization, loglinear parameters above 0 indicate cells that are more frequently observed and below 0 cells that are less frequently observed.

The saturated model does not impose any restrictions on the expected frequency table and therefore perfectly reflects the observed frequency table (Bishop, Fienberg, & Holland, 1975). Its parameters can be determined in a closed form. Imposing a priori restrictions on the model parameters results in nonsaturated loglinear models. One common restriction is to eliminate the two-variable effect ($\tau_{ij}{}^{AB}$). This restriction results in the independence model where no association between the two variables is expected. Imposing different restrictions on the model parameters allows for the test of different substantial theories. There are two classes of restricted loglinear models: in hierarchical models, the presence of a higher-order effect (two-variable effect) requires the presence of lower-order effects sharing the same superscript (s). For example, if the two-variable ($\tau_{ij}{}^{AB}$) effect is present, both one-variable effects ($\tau_i{}^A$) and ($\tau_j{}^B$) have to be present as well. In hierarchical models, the observed marginal frequency tables corresponding to the highest-order effects are perfectly reproduced. Nonhierarchical loglinear models do not require lower-order effects to be present if higher-order effects sharing the same superscripts are present.

The model can readily be extended to analyze more-dimensional frequency tables. However, the analysis of more-dimensional frequency tables becomes more complex, since higher-order interactions may be present and, additionally, estimation problems due to sparse tables may arise (Agresti, 2002).

Goodness of Fit/Model Selection

The goodness of fit of loglinear models can be tested relying on the Pearson-χ^2 or the likelihood-χ^2 statistic. The degrees of freedom depend on the sampling design. Multidimensional frequency tables can be the result of different sampling designs. With a multinomial sampling design, the joint frequency distribution of the categorical variables for a given number of participants is analyzed. In the product-multinomial sampling design, the distribution of (at least) one variable is determined. In the Poisson sampling design, neither the number of observation units nor the distribution of the variables is known. The number of meaningful random parameters in the model which can be statistically tested in meaningful ways changes, and thus, the degrees of freedom change as well (Agresti, 2002). The AIC and BIC coefficients can be used to compare non-nested loglinear models with each other. Model diagnosis can be carried out relying on residuals: Pearson residuals directly refer to χ^2-square contributions of a given cell. Standardized Pearson residuals are asymptotically normally distributed. Both can be used to identify expected cell frequencies that do not match observed cell frequencies and, thus, indicate model misfit.

Rater Agreement

Loglinear models can also be used to investigate rater agreement in a categorical rating system.

The loglinear model allows for determining conditional probabilities of receiving a particular response by an observer given the responses of other observers and for inspecting residuals that compare the frequencies with which certain types of agreement and disagreement occur compared to what would be expected with some predicted pattern (Agresti, 2002). In the saturated model, the one-variable effect allows for determining the difference in the marginal distributions reflecting different perceived prevalence rates between raters. The two-variable effect depicts the deviation of a particular cell from its expected value given the overall and one-variable effects. Generally, one would expect high values for cells indicating agreement and low values for cells indicating disagreement. Special models for rater agreement are the quasi-independence models and the symmetry models. In the quasi-independence models, the ratings are independent from each other except for associations in agreement cells; in the symmetry models the marginal distributions and disagreement cells are modeled as well (Agresti, 2002). These models allow for determining if raters can be conceived as statistically interchangeable.

Generalized Linear Model

Loglinear models can be seen as a special case of the generalized linear model family (GLM). The most general additive form is the following:

$$\ln(e_{ij}) = \Sigma_j{}^J \lambda_j x_{ij},$$

where e_{ij} denotes a cell entry; λ_j, a loglinear parameter; and x_{ij}, an element of the design matrix. The use of a design matrix allows for a very flexible specification of hierarchical and nonhierarchical but also nonstandard loglinear models (Rindskopf, 1990).

Loglinear Models with a Weight Vector

The general loglinear model can be extended by including a weight vector (Haberman, 1978). Choosing the sample size as weight results in log-rate models. In these models the rate of an event is modeled instead of its frequency. Choosing the length of the observation period leads to a log-rate model that is equivalent to piecewise exponential survival models. Additionally, the weight vector allows for the analysis of incomplete tables (tables with structural zeros) or for the correction of sample design effects (Vermunt, 1997).

Logit Models

Loglinear models model associations between variables. If one variable is considered as dependent variable and other variables as explanatory variables, the so-called logit model results. It is the counterpart to regression analysis for continuous outcome variables. In the standard logit model, the outcome is binary; if more than two categories can be observed, the model is called multinomial logit model or multinomial response model (Agresti, 2002). Combining a set of (multinomial) logit models as in path analysis leads to the so-called modified path model (Goodman, 1973). In this model a series of marginal tables is analyzed using (multinomial) logit models.

Loglinear Models with Latent Variables

Integrating ▶ latent variables in loglinear models allows for the correction for measurement error. One special variant of loglinear models with latent variables is the ▶ latent class model (Lazarsfeld, 1950). Based on the assumption of local stochastic independence, a latent variable can be introduced into the loglinear model. For different categories of the latent variable, different patterns of associations among the manifest variables are assumed rendering the model a special variant of finite mixture models. If there are more than one latent variable the model extends to the modified LISREL approach (Hagenaars, 1993). In this model, directed and undirected associations between latent variables can be modeled. Additionally, external or explanatory variables may be integrated, multiple groups can be investigated, and direct effects (correlated residuals) between manifest indicators may be specified. This analysis parallels ▶ structural equation models for continuous observed variables.

Event History Models

Single Events

Event history data allow for the analysis of transitions between different states across time. Event history models which can be reformalized as or which belong to the family of loglinear models are the piecewise exponential survival model, Cox' semiparametric model; but also the logit approach may be used to analyze event data (Aalen, Borgan, & Gjessing, 2008; Vermunt, 1997). These models allow for time-stable but also for time-varying covariates. Within this framework, it is possible to analyze one specific event of interest but also specific competing events in so-called multiple-risk models. Additionally, multiple events can be linked to each other as covariates but also as being mutually interdependent in multivariate extensions of event history models.

Repeated Events

Within the framework of event history analysis, repeated events (such as getting and losing a job) can also be analyzed. The most advantageous approach is to analyze the repeated cycles simultaneously in multiple state models (Aalen et al., 2008; Vermunt, 1997). With respect to the single-vent analyses, some important differences occur: there may be different original states, individuals may run through multiple cycles, and the individual history (the already lived cycles) may influence transition rates, that is, the probability to lose a job may be higher for individuals who already lost their jobs several times. Special models with transition rates between states that do not depend on the number of previous cycles or the individual history are the Markov chain models. Within this model, the transition rate only covaries with the initial state, the previous state, and the destination state – the semi-Markov model or Markov renewal model is less restrictive allowing for dependencies of transition rates due to time between specific events. Additional covariates may also be included in the model. Multiple state models can also be specified by means of log-rate models (Vermunt, 1997).

Hagenaars (1990) presents loglinear models for the analysis of panel data. The one-group pretest-posttest design, for example, allows for the evaluation of a specific intervention. The nonequivalent control-group design allows for the incorporation of additional (quasi-) experimental groups into the model. These two models are special cases of the path-model approach for manifest categorical variables or the modified LISREL approach with latent variables.

Multiple Group Approaches

Extensions of the loglinear model for the analysis of multiple groups are straightforward by incorporating a stratifying variable indicating the groups which may interact with different effects in the statistical model of interest (e.g., Hagenaars, 1990).

Sample Size Requirements

Loglinear models generally require large sample sizes. For the standard model, it is generally required that no cells have a 0 expectancy and that only few expected cell frequencies fall into the range below five. Agresti (2002) discusses statistical techniques to still obtain valid model results.

Software

Standard loglinear models can be estimated with standard software packages as, for example, SPSS, R, and SAS. More complex models like loglinear path models, latent class models, and multilevel extensions of these models require special software like Latent Gold (Vermunt & Magidson, 2008) or Mplus (Muthén & Muthén, 1998–2012), for example.

Cross-References

- ▶ General Linear Model
- ▶ Latent Class Analysis
- ▶ Latent Variable Path Models
- ▶ Latent Variables
- ▶ Poisson Models

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Log-Logistic Distribution

► Log-Logistic Models

Log-Logistic Models

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Synonyms

Fisk distribution; Log-logistic distribution

Definition

The log-logistic model is a statistical regression model for a nonnegative random outcome variable. It is applicable in cases where the logarithmized outcome variable follows a logistic distribution. In survival analysis, it is used to model hazard rates that are initially increasing and finally decreasing.

Description

In quality of life (QOL) research, one may be interested in predicting the time an individual will live after a severe medical diagnosis like cancer. Typically, these patients have an initially increasing and later decreasing mortality. Statistically, this research question may be answered relying on event history analysis (also named hazard or survival analysis in biostatistics, duration models in economics, reliability analysis in engineering). A hazard rate, generally, describes the conditional probability of an event to occur at a given time interval. Hazard models fall into three groups: nonparametric, semi-parametric, and parametric models (see Aalen, Borgan, & Gjessing, 2008; Mills, 2011). The log-logistic model belongs to the family of parametric hazard rate models. In parametric models, assumptions are made about the distribution of failure or event times (the events). For the log-logistic model, the assumption is made that the density function of the residual in the regression predicting the logarithm of the time until occurrence of the event follows a logistic distribution. Additionally, the covariates are assumed to accelerate or decelerate the waiting time until the event occurs. Therefore, the model belongs to the subgroup of accelerated failure time (AFT) parametric hazard models.

Survival Time

In AFT models, the logarithm of the survival time ($\ln(t_j)$) is regressed on a set of covariates ($x_1, \ldots, x_c$):

$$\ln(t_j) = \beta_1 x_1 + \cdots + \beta_c x_c + \cdots + \beta_c x_c + z_j$$

where β_c represents the regression weight for covariate x_c. The density function of the residual [f(z_j)] is assumed to follow a logistic distribution (see Hosmer, Lemeshow, & Mary, 2008; Mills, 2011). Effects in AFT models can be interpreted as change in the timescale by the factor $[\exp(-\sum_{c=1}^{C} \beta_c x_c) = \lambda_j]$. If this factor is larger than 1, the survival time accelerates, that is, the time until the expected occurrence of the event is longer. The effect of the covariates can thus directly be interpreted in absolute terms (hours, month, etc.).

Another central assumption is that the hazard function is the same for all individuals. That is, the principal shape of the function describing the risk (chance) to experience the event is the same for all individuals (e.g., first increasing then decreasing); however, for some individuals, the time line is more stretched, and for others, it is contracted. That is, some individuals move "faster" through time than others. Therefore, the first group experiences the same time stages as the latter, but these time stages are shorter. The acceleration factor (γ) captures these differences.

Survival Function

The survival function $\hat{S}(t))$ depicts the probability that a survival time T is equal or larger than a particular time t. It corresponds to the proportion of individuals that survive beyond t:

$$\hat{S}(t)) = [1 + (\lambda_j t_j)^{1/\gamma}]^{-1}$$

The factor $[\exp(-\sum_{c=1}^{C} \beta_c x_c) = \lambda_j]$ depicts the effects of the covariates; the acceleration factor γ is generally treated as an ancillary parameter that has to be estimated from the data.

Hazard Rate

The hazard rate depicts the rate at which subjects experience the event (at given time t) given that they did not experience the event until then (e.g., the rate at which subjects who have still been alive die at a given time t).

Fixed Versus Time-Varying Covariates

Covariates in log-logistic models may be constant or time varying. Time-varying covariates are those covariates whose values change during the study (e.g., being employed or not, the number of children, income). In the log-logistic model, it is possible to include both types of covariates in the model (e.g., Hosmer et al., 2008; Mills, 2011). In models with time-varying covariates, lagged effects may be included respecting that a covariate may not show its effect immediately but at a later point in time. Specifying lagged effects also avoids the problem of reversed causation (Mills, 2001).

Censoring

Due to the fact that the cumulative density distribution of the log-logistic regression can be written in closed form, the model is appropriate to also analyze censored data. Censoring can appear as left, right, and interval censoring (see Mills, 2011).

Model Building of Log-Logistic Regressions

The choice of the logistic distribution to describe the density function of the residual z_j should be made carefully. It can be either made upon theoretic assumptions based on existing knowledge about the shape of the hazard or can be determined empirically. Mills (2011) provides a decision tree on how to determine the correct specification of the hazard rate. In a first step, one has to decide if the shape of the baseline hazard function is known. If it is not known, the semi-parametric Cox hazard rate model should be specified in order to empirically find the best parameterization of the baseline hazard function.

In step two, one has to determine how the covariates might affect the hazard rate. If covariates are supposed to multiply the timescale, accelerated failure time (AFT) models are appropriate and one might choose the log-logistic distribution (among others as Weibull, gamma, or log-normal) as the density function. The choice of the density function is crucial since incorrect model specifications affect the substantive interpretation of the model (Bergström & Edin, 1992) as well as the effect of the covariates. The effects of the covariates are also sensitive to included and omitted covariates (Box-Steffensmeier & Jones, 2004). The selection of covariates may be done relying on the seven-step approach proposed by Hosmer et al. (2008). In this approach starting with a Kaplan-Meier (KM) model, covariates are selected based on theoretical reasoning and statistical analyses, transformations, and possible interactions of the covariates are considered, and finally, the model will be evaluated.

Model Diagnosis (Goodness-of-Fit)

The overall goodness-of-fit of the model is most commonly evaluated by the log-likelihood test. If models have to be compared to each other, the likelihood ratio test for nested models and the Akaike information criterion, for nested and not nested models, may be considered. Furthermore, residuals of the covariate effects should be reasonably low.

To check if the model is correctly specified, Cox-Snell residuals may be considered (Box-Steffensmeier & Jones, 2004). In principle, there are two sources of misspecification: influential data points and nonlinearity. Single observations that greatly alter the parameter estimates (influential data points) can be determined by score residuals (Hosmer et al., 2008). Nonlinearity which leads to an incorrect specification of the parametric part of the model can be identified relying on deviance (martingale) residuals and component-plus-residual (partial-residual) plots (Hosmer et al.; Klein & Moeschberger, 1997).

Extension: Unobserved Heterogeneity, Frailty, and Recurrent Event Models

The basic assumption that all subjects are prone to experience a particular event in the same way, that they are homogeneous, and that the timing of the events is independent from one another is questionable (Box-Steffensmeier & De Boef, 2006). Unobserved heterogeneity can be accounted for by frailty models with fixed (see Allison, 2009) and random effects (multilevel models; e.g., Mills, 2011). The general purpose of frailty models is to describe the differences in the time to event for different distinct subgroups of observations. Subgroups may be classes, schools, countries, clinics, and so on but also individuals (with recurring events). Across classes, for example, the "frailty" to pass a nationwide exam will most probably differ although pupils of different classes share the same background variables. Across individuals, for example, the "frailty" to get employed again will also differ due to unobserved effects but also due to dependence of the events (Box-Steffensmeier & De Boef, 2006). Aalen et al. (2008) name different sources of heterogeneity: biological or innate genetic differences, but also dynamic effects as increasing stress in one's lifetime, or the discovery of covariates or cause of the outcome at an early or later stage in time (e.g., detection of cancer).

Cross-References

- ▶ Multilevel Analysis
- ▶ Parametric Analysis
- ▶ Random Variable
- ▶ Regression Coefficients
- ▶ Survival Analysis

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Lokasie

► South African Township Transformation

Long Work Hours in Europe

► Work-Life Conflict in Europe

Longevity and Chinese Medicine

► Chinese Medicine and Yang Sheng

Longitudinal Data Analysis

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Synonyms

Correlated data analysis; Growth curve modeling; Repeated measures analysis; Trajectory analysis

Definition

Longitudinal data analysis consists of the statistical tools and methods used to analyze data collected on the same group of individuals on multiple occasions over time.

Description

Longitudinal data, i.e., data collected on the same individuals over time, are commonly encountered in quality of life (QOL) research, because researchers are interested in how a disease or intervention affects an individual's quality of life over time (Fairclough, 2005). Such studies generally measure the trajectory of QOL in patients with chronic or terminal diseases, in relation to their disease progression, to reveal whether different aspects of QOL become impaired over time (Swigris et al., 2005). They typically involve obtaining the same or similar assessment of QOL over time (e.g., every month) for a group of patients. Since repeated measurements assessed on the same individual over time are likely to be correlated, such data violate the assumption of independent measurements that is typically required by standard statistical techniques. Specialized analyses methods are thus necessary for longitudinal data analyses that can accommodate temporally correlated data (Diggle et al., 2002).

Longitudinal data analyses are usually more powerful than cross-sectional analyses, both in terms of explanatory power and statistical efficiency. There are a number of reasons for this:

- The prime advantage of a longitudinal analysis is its effectiveness for studying change over time. Thus, in cross-sectional analyses we can only assess the difference in QOL across two subpopulations (e.g., intervention and control groups in a randomized trial). However, in longitudinal analyses, we can further estimate whether the two subpopulations are different in terms of the expected change in QOL measures over time.
- In addition to comparing various groups of research subjects (cross-sectional analyses),

longitudinal analyses also entail comparison of the outcomes from the same individual at different time points. In this way, each individual can be thought of as serving as his or her own control, thus adjusting for the variability induced by unmeasured or difficult to measure characteristics such as environmental exposures and personality, among others.

- With their ability to distinguish between the degree of variation in QOL across time for *one* individual and the variation in QOL *among* individuals, longitudinal studies can acknowledge and account for naturally occurring differences among research subjects.

Longitudinal analysis of continuous outcomes (which is often the case for QOL measures developed from a standardized instrument) is essentially linear regression, with the complication that here the observations are not independent, since there are repeated measurements from the same individual over time. Thus, here we also need to model the variability in the data. Specifically, there are two likely sources of variation unique to longitudinal data:

1. *Random effects*: Individuals sampled at random from a population may exhibit random variation between themselves. This variability would reflect natural heterogeneity among individuals because of underlying unmeasured or difficult to measure factors (such as genetic, environmental, or personality traits that are difficult to quantify).
2. *Serial correlation*: Repeated measurements from the same individual over time can be correlated. Further, measurements from a person at two adjacent time points (say, month 1 and month 2) are expected to be more correlated (i.e., more similar) than those from more distal time points (say, month 1 and month 6).

In addition, similar to cross-sectional studies, we can also expect some measurement error, which is the variability induced by the measurement process itself. For instance, simultaneous QOL assessments from the same person may be slightly different.

Choice of a specific model to fit continuous longitudinal data is usually made by looking at exploratory plots of the data. Maximum likelihood estimation, which fits a model that maximizes the probability of obtaining the observed set of data, can be used to fit most longitudinal models for continuous outcomes, often using a robust covariance estimator that does not require the random effects to be correctly specified in full detail (Royall, 1986).

In contrast to continuous data, there are subtle nuances specific to the analyses of discrete longitudinal outcomes data (i.e., binary, categorical, or count outcomes) (Neuhaus, 1992). Longitudinal data analyses methods for discrete outcomes can either use population-averaged marginal modeling using generalized estimating equations (GEE) (Liang & Zeger, 1986) or subject-specific hierarchical modeling using generalized linear mixed models (GLMM) (Breslow & Clayton, 1993; Stiratelli et al., 1984). The differences between these two methods are best illustrated through an example. Suppose a randomized clinical trial wishes to test whether an intervention is more effective at lowering rates of impaired QOL over time, compared to usual care (or controls) by randomizing individual study subjects to either an intervention or control group.

In the case of the above example, the population-averaged approach models average outcomes (rates of impaired QOL) over intervention and control subjects who share common explanatory features while accounting for correlation among repeated QOL measures assessed over time from the same individual. Note that if there is heterogeneity in the outcome prevalence rates across different subjects, the overall treatment effect would be the average of individual treatment effects for each subject. The regression coefficient for treatment in this type of model would be interpreted as the average log odds ratio for impaired QOL among subjects in the intervention group relative to subjects in the control group.

The subject-specific approach adjusts for repeated measures over time by allowing for individualized regression coefficients,

i.e., coefficients which vary from one person to another, and may depend on their treatment group allocation (and other individual characteristics). The model consists of a two-step hierarchical regression framework, where the first step models the prevalence of impaired QOL for a subject as a function of his/her treatment group assignment, as well as an overall subject-specific effect. In the next step, this unobserved subject-specific effect is related to observed subject-level covariates through a linear regression equation. Compared to the population-averaged model, there are some subtle differences in interpretation for the regression coefficients in this approach. Here the regression coefficient for treatment may be interpreted as the log odds ratio for impaired QOL when a person is assigned to the intervention group, relative to if that *same* person were to be assigned to the control group.

Note that, given the subtle differences in interpretation between estimates derived from the two approaches, either one may be valid depending on the question one is interested in answering. Caregivers may find the within-individual treatment effects that are best estimated by subject-specific approaches to be most useful, while the population-averaged approach provides robust estimates that are more intuitively appealing from a public health perspective. Software that can accommodate either approach is widely available (e.g., SAS [PROC GENMOD, PROC MIXED, PROC GLMM], STATA, SUDAAN, R). In addition, longitudinal analysis of data from multiple QOL scales assessed over time introduces an additional layer of complexity into the analysis, where issues of multiple comparisons need to be addressed (Fairclough, 2005).

Statistical techniques for longitudinal data analysis can easily handle missing data, and the estimates obtained will not be biased as long as we can reasonably assume that the data are missing at random. This is important because longitudinal studies typically do have missing data, often with increasing attrition over time. However, some studies may have informative missing data due to nonrandom dropout (e.g., selective attrition may occur among the sickest study subjects due to disease progression or death). Robust and methodologically sound approaches to deal with such situations are available and include multiple imputations (Rubin, 1987) and pattern-mixture models that perform stratified analyses within strata defined by dropout time (Guo et al., 2004).

Cross-References

- ▶ Growth Curve Modeling
- ▶ Hierarchical Linear Modeling
- ▶ Linear Regression Model
- ▶ Missing Data
- ▶ Mixed Effects Models
- ▶ Robust Statistical Tests

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Longitudinal Investigations of Happiness

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Definition

In a longitudinal study, the happiness of the same people (the same sample or panel of respondents) is measured for an extended period of time. In practice, most panel studies conduct annual interviews.

Description

Longitudinal studies of happiness have advantages and payoffs similar to longitudinal studies in other areas of social science (e.g., longitudinal studies of income). Researchers can investigate stability and change in happiness, factors which may cause change, and the *adaptations* that people make to try and maintain or increase their happiness. Longitudinal studies have been a key source of advances in happiness research in the last 20 years or so. Previously, most studies were cross-sectional (i.e., data related to one moment in time), which precluded direct investigation of the causes of change.

The two longitudinal studies most frequently cited by QOL researchers are the *German Socio-Economic Panel* (*SOEP*) and the *British Household Panel Survey* (BHPS). These are both national socioeconomic panel surveys in which questions about life satisfaction and satisfaction with various life domains are included in questionnaires mainly devoted to economic issues. Both surveys are still running – the German panel began in 1984 and the British panel in 1991 – and both conduct annual interviews with very large nationwide samples. All adult and late adolescent members of sample households are interviewed separately.

Some key issues and empirical findings drawn from panel studies are discussed below.

Stability and Change

It is often claimed that the life satisfaction of adults is stable in the long term, although subject to temporary fluctuations. Indeed, this is a central tenet of ▶ *set-point theory* (Brickman & Campbell, 1971; Lykken & Tellegen, 1996). But the stability of adult happiness could not be directly assessed until long-term panel studies became available. Instead it was inferred from evidence about the links between happiness and the stable personality traits of ▶ *extroversion* and *neuroticism* (Costa & McCrae, 1980), from studies showing the merely temporary effects of most ▶ life events (Diener, Suh, Lucas, & Smith, 1999), and from twin studies (Lykken & Tellegen, 1996). Now that panel studies are available, it is becoming clear that substantial minorities of adults record substantial and apparently permanent changes in their life satisfaction (Headey, 2006; Headey, Muffels, & Wagner, 2010).

Impact of Major Life Events on Happiness

A recent thorough investigation, based on panel research, concluded that the only reasonably common event which, on average, has a long-term effect on happiness is repeated or long-term ▶ unemployment (Clark, Diener, Georgellis, & Lucas, 2008). However, estimates of the *average* effects of life events may be misleading. There is some evidence, also from panel studies, that although the average long-term effect on happiness of getting married is zero, there are some individuals who are happier in the long term and some who are unhappier (Lucas, Clark, Georgellis, & Diener, 2003). It has been suggested that individuals who marry relatively neurotic partners tend to become unhappier, whereas those who marry more emotionally stable partners become happier (Headey et al., 2010). Somewhat stronger evidence has been found about the effects of suffering

a chronic disability (e.g., arthritis, type 2 diabetes) in adulthood. Some individuals report only a short-term decline in happiness, but others appear to suffer long-term declines (Lucas, 2007).

A clue to understanding these apparently puzzling and somewhat contradictory findings may lie in the moderating (or enhancing) effects of personality traits. In studies conducted by psychologists, it has been found that relatively extroverted individuals extract more happiness from positive events than introverts (Lucas & Baird, 2004) and that relatively neurotic people react worse to adverse events than more emotionally stable people (Larsen, 1992). However, these studies mainly deal with short-term effects. Longer-term panel data suggest that the interplay between personality traits and life events might be more complicated. Over the years, extroverted individuals repeatedly experience more positive events than introverts, and relatively neurotic individuals experience more adverse events (Headey & Wearing, 1989). So it seems that personality traits, to a limited extent, predispose individuals to experience different patterns of events. Personality predispositions may also then account for the finding that, among the minority who records long-term changes in happiness, extroverts are more likely to record gains and neurotics are likely to record losses (Headey, 2006).

Money: Impact of Changes in Economic Well-Being on Subjective Well-Being/Happiness

A major issue investigated with longitudinal and time series studies of happiness is the link between money, or economic well-being, and happiness. All discussions of the issue start with the ▶ *Easterlin Paradox* (1974); the claim that gains or losses in income only produce temporary gains in happiness because (1) the gainers notice that others in the community are gaining or losing income at about the same rate as they are (a ▶ *social comparison* explanation) and/or (2) gains in income lead to upward revisions in aspirations, so that the gap between achievement and aspiration is only temporarily reduced. Recent critiques of the paradox have ranged from claiming that it is entirely incorrect (Stevenson & Wolfers, 2008) to claiming that it is generally true but can be breached if the comparison (reference) group with which income gainers and losers compare themselves is clearly faring much better or worse than they are themselves (Frijters, Haisken-Denew, & Shields, 2008). Easterlin and Angelescu (2009) has responded to these critiques with the claim that no evidence has yet been produced, showing that gains or losses in economic well-being can lead to long-term (rather than temporary) changes in happiness.

Reverse Causation: Top-Down and Bottom-Up Theories of Happiness

In most longitudinal studies, as well as cross-sectional studies, researchers focus on the correlates and presumed causes of happiness. But in a few longitudinal studies, happiness is treated as a cause rather than an effect. Deeg and van Zonneveld (1989), using Dutch health data, showed that happy people live longer. More specifically, they showed that individuals who were relatively happy when happiness was first measured (baseline) lived longer than people of the same age who initially had about the same health status, but were less happy. On somewhat similar lines, Diener and Biswas-Diener (2002) report several studies showing that students who rated themselves as happy during their school or college years earned considerably higher incomes a decade or more later than students who had the same level of academic ability but who rated themselves as unhappy.

A more general controversy, which underlies studies which treat happiness as a cause rather an effect is the so-called *top-down versus bottom-up* controversy (Diener et al., 1999). Most theories of happiness are bottom-up; they treat overall happiness as being due to a weighted average of social and economic circumstances, health, and satisfaction with various *life domains*. Top-down theories, on the other hand, are based on the idea that individuals have stable, long-term dispositions to be more or less unhappy (see also set-point theory). Differences in social and economic circumstances,

and satisfaction with life domains, are then viewed mainly as consequences or spin-offs from these stable dispositions.

Very Recent and Possible Future Contributions of Longitudinal Studies of Happiness

In very recent times, longitudinal research has shown that members of the same family, particularly husbands and wives, influence each other's happiness over time. In other words, when one family member's (un)happiness increases, others in the family generally become (un)happier too (Schimmack & Lucas, 2010). The happiness of parents affects the happiness of their children, and to a lesser extent, changes in children's happiness also affect the happiness of parents (Agache & Trommsdorff, 2010). The influence of parents on children's happiness persists into adulthood, so there is a long-term dividend due to happy or unhappy parenting (Headey, Muffels, & Wagner, forthcoming).

Very few research results are based on really long-term data – data about lifetime happiness. However, as noted above, the German panel data (the longest time series available) have been used to track stability and change in happiness and to estimate the mostly temporary effects of specific life events. There is certainly no study which deals in a comprehensive way with the adaptations which people make in order to cope (or fail to cope) with positive and negative "shocks" to their happiness.

In summary, it is clear that longitudinal studies have already made major contributions to happiness research. Up to now, household panel surveys have been the main data source. It seems possible that, in future, other potential sources of longitudinal data will play a greater part. A few experimental studies, intended to enhance happiness, have been conducted (e.g., Seligman, 2002; Lyubomirsky, Sheldon, & Schkade, 2005). These mostly report just short-term effects on happiness. However, there seems no obvious reason, in principle, why longer-term studies could not be undertaken. It is also possible that longitudinal data generated for other purposes – for example, data from social networking sites (Davies, 2011) – could be insightfully used for happiness research.

Cross-References

- ▶ Adaptation
- ▶ Easterlin Paradox
- ▶ Extroversion
- ▶ Life Events
- ▶ Set-Point Theory
- ▶ Social Comparison Theory
- ▶ Unemployment

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Longitudinal Structural Equation Modeling

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Definition

Longitudinal structural equation models (LSEMs) are statistical models that allow separating measurement error from true individual differences related to variability and/or change processes.

Description

Overview: Models for Measuring Variability Versus Change

In the context of LSEMs, it is common to distinguish between models for analyzing variability and models for analyzing change (Eid, 2007). *Variability* refers to short-term fluctuations around a fixed set point that are usually reversible (e.g., mood states, anger, hormone levels), whereas *change* is typically more long-lasting and often irreversible (e.g., developmental processes like physical growth or decline in fluid intelligence across adulthood). The most prominent LSEM approaches for modeling variability are based on latent state-trait (LST) theory (Steyer, Ferring, & Schmitt, 1992; Steyer, Schmitt, & Eid, 1999). Common LSEM approaches for modeling change are autoregressive (AR) models (Jöreskog, 1979), latent change (LC) models (McArdle & Hamagami, 2001; Steyer, Eid, & Schwenkmezger, 1997), and latent growth curve (LGC) models (Bollen & Curran, 2006; Meredith & Tisak, 1990). In addition, hybrid approaches that combine features of the above models are available (e.g., Eid, Courvoisier, & Lischetzke, 2012).

LST Models

LST theory was developed by Steyer et al. (1992, 1999) and represents an extension of classical test

theory (CTT; Novick, 1966) to the measurement of persons in situations. In contrast to CTT, LST theory accounts for the fact that measurement does not take place in a situational vacuum (i.e., we always measure *persons in situations*; Anastasi, 1983). In addition to providing the theoretical background for defining and analyzing states and traits, LST theory supplies a framework based on which many other kinds of longitudinal models – including models for measuring change – can be formulated.

According to LST theory, a person's observed score (e.g., on a test, questionnaire) is composed of (1) a latent person-specific (or "trait") component (e.g., an individual's habitual mood level or well-being "set point"), (2) a latent occasion-specific residual component (e.g., a situation-dependent deviation from the habitual mood level due to a specific positive or negative event or a person x situation interaction), and (3) a random measurement error component. Formally, an observed variable (indicator) Y_{it} (i = indicator, t = time point) is decomposed into a latent state variable S_{it} plus an error variable e_{it}:

$$Y_{it} = S_{it} + e_{it.} \tag{1}$$

Each latent state variable itself is decomposed into a latent trait variable T_{it} and a latent state residual variable SR_{it}:

$$S_{it} = T_{it} + SR_{it.} \tag{2}$$

Inserting Eq. 2 into Eq. 1 yields the basic decomposition in LST theory:

$$Y_{it} = T_{it} + SR_{it} + e_{it.} \tag{3}$$

A major strength of LST theory is that all latent variables introduced above are not simply "assumed to be there," but are well-defined in terms of conditional expectations of observed variables or functions of these conditional expectations (Steyer et al., 1992). The latent state variable S_{it} is defined as the conditional expectation of Y_{it} given persons and situations:

$$S_{it} := E(Y_{it}|\ \text{persons},\ \text{situations}). \tag{4}$$

The error variable e_{it} is defined as a residual, that is, as the difference between Y_{it} and the conditional expectation of Y_{it} given persons and situations:

$$\begin{aligned} e_{it} :&= Y_{it} - E(Y_{it}|\ \text{persons},\ \text{situations}) \\ &= Y_{it} - S_{it}. \end{aligned} \tag{5}$$

Given its definition as a residual variable, e_{it} has an expected value of zero and is uncorrelated with S_{it}.

The latent trait variable T_{it} is defined as the conditional expectation of Y_{it} given persons alone (i.e., it does not depend on the situation):

$$T_{it} := E(Y_{it}|\ \text{persons}). \tag{6}$$

The latent state residual variable SR_{it} is defined as the difference between the conditional expectation of Y_{it} given persons and situations and the conditional expectation of Y_{it} given persons alone:

$$\begin{aligned} SR_{it} :&= E(Y_{it}|\ \text{persons},\ \text{situations}) - E(Y_{it}|\ \text{persons}) \\ &= S_{it} - T_{it}. \end{aligned} \tag{7}$$

Of key interest in an LST analysis are the coefficients of consistency (Co), occasion specificity ($OSpe$), and unreliability ($URel$):

$$Co(Y_{it}) = Var(T_{it})/Var(Y_{it}). \tag{8}$$

$$OSpe(Y_{it}) = Var(SR_{it})/Var(Y_{it}). \tag{9}$$

$$URel(Y_{it}) = Var(e_{it})/Var(Y_{it}). \tag{10}$$

The consistency coefficient indicates to which degree observed individual differences are determined by person-specific effects. The occasion-specificity coefficient indicates to which degree observed individual differences are determined by situations and/or person-situation interactions. The unreliability coefficient indicates to which degree observed individual differences are determined by measurement error. $Co(Y_{it})$, $OSpe(Y_{it})$, and $URel(Y_{it})$ sum up to 1.

All of the above definitions are unrestrictive and purely theoretical in nature. They do not define specific testable models and do not allow estimating the coefficients defined in Eqs. 8 through 10. In order to formulate models of LST theory that allow estimating these parameters, restrictive assumptions need to be introduced. As an example, consider the following very simple LST model, which is defined by the following assumptions:

1. Equivalence of latent trait variables (all latent trait variables are identical and can thus be replaced by a single common latent trait factor):

$$T_{it} = T_{i't'} = T, i, i' = 1, \ldots, I; t, t' = 1, \ldots, U. \quad (11)$$

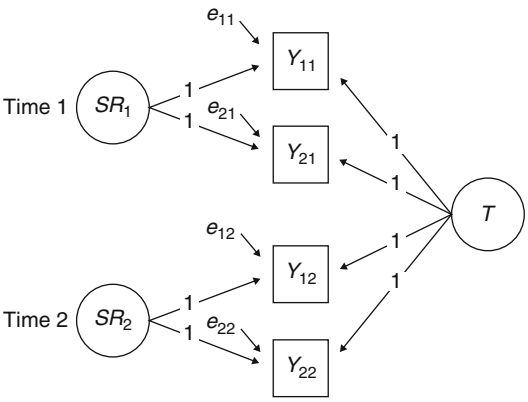
2. Occasion-specific equivalence of latent state residual variables (all latent state residual variables measured at the same occasion of measurement are identical and can thus be replaced by common time-specific latent state residual factors SR_t):

$$SR_{it} = SR_{i't} = SR_t. \quad (12)$$

Given these assumptions, the simple LST model implies the following measurement model for the observed variables:

$$Y_{it} = T + SR_t + e_{it}. \quad (13)$$

This model can be used in practice if each person provided scores on at least two observed variables measured on at least two measurement occasions (e.g., two parallel depression scales or test halves assessed on two time points). A path diagram of the model for the minimal (2×2) case is shown in Fig. 1. In this model, the state residual factors are by definition uncorrelated with the trait factor, and all error variables are by definition uncorrelated with all latent state residual and trait factors. Two additional assumptions made here are that all error variables are uncorrelated with each other and that all latent state residual factors are uncorrelated with each other. A variety of more complex models of LST theory have been described in the literature (e.g., Cole, Martin, & Steiger, 2005; Geiser & Lockhart, 2012; Steyer et al., 1992, 1999; Steyer, Geiser, & Fiege, 2012).



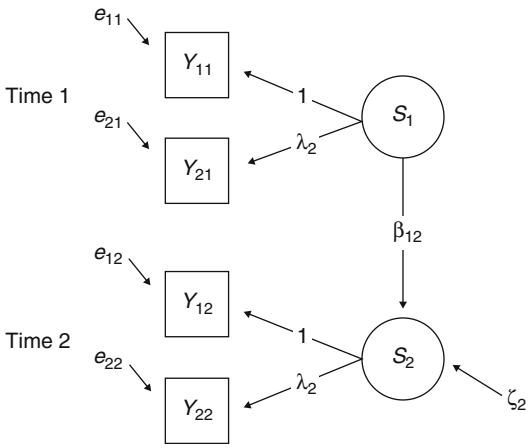
Longitudinal Structural Equation Modeling, Fig. 1 Simple LST model for two observed variables measured at two time points. All factor loadings are assumed to be 1

AR Models

The basic idea of AR models is that earlier behavior is the best predictor of later behavior. First-order AR models with observed variables assume that a measure Y_t of a construct (e.g., depression) at a given point in time t is linearly regressed on the same measure at the immediately preceding time point, Y_{t-1}:

$$Y_t = \beta_{0t} + \beta_{1t} Y_{t-1} + e_t, \quad (14)$$

where β_{0t} and β_{1t} are constant regression intercept and slope coefficients, respectively, and e_t is a residual (error) variable with an expected value of 0. Individual change is captured in the values of the residual variable e_t, since e_t reflects that part of Y_t that cannot be predicted from Y_{t-1}. Measurements are perfectly stable over time only if jointly $\beta_{0t} = Var(e_t) = 0$ and $\beta_{1t} = 1$. Whenever $Var(e_t) > 0$, the autoprediction of Y_t from Y_{t-1} is imperfect. In AR models with observed variables this can either be due to (1) true changes in the construct, (2) measurement error, or (3) a combination of both.



Longitudinal Structural Equation Modeling, Fig. 2 Latent AR model based on common latent state factors for two observed variables measured at two time points. In this example, time invariant factor loadings λ_i are assumed. The loadings of the first indicator are fixed to 1 for identification, respectively

This shows that AR models with observed variables do not explicitly take measurement error in Y_{t-1} into account, so that the amount of true change may not be correctly estimated. Moreover, the assumption of measurement invariance (equal origin and equal units of measurement) across time is implicitly made, but cannot be tested.

AR models with latent variables (Hertzog & Nesselroade, 1987; Jöreskog, 1979) account for unreliability in both Y_t and Y_{t-1} and allow testing for measurement invariance. Latent AR models (see Fig. 2) can be formulated on the basis of the latent state variables defined in Eq. 3. Let us assume that all latent state variables measured on the same measurement occasion differ only by an additive and a multiplicative constant (assumption of occasion-specific congenerity of state variables; Steyer et al., 1992). Then, the indicator-specific latent state variables S_{it} can be replaced by a *common* latent state factor S_t:

$$S_{it} = \alpha_{it} + \lambda_{it} S_t, \tag{15}$$

where α_{it} is a constant intercept that corresponds to the origin of measurement and λ_{it} is a constant slope coefficient (factor loading) that corresponds to the units of measurement. Each observed variable can then be expressed as

$$Y_{it} = \alpha_{it} + \lambda_{it} S_t + e_{it}. \tag{16}$$

If strong measurement invariance holds, the coefficients α_{it} and λ_{it} no longer depend on the occasion of measurement, but are constant across time so that we can drop the index t (Widaman & Reise, 1997):

$$Y_{it} = \alpha_i + \lambda_i S_t + e_{it}. \tag{17}$$

The assumption of measurement invariance can thus be tested by comparing the fit of the model in Eq. 16 to the fit of the more restrictive model in Eq. 17.

In first-order latent AR models, the autoregressive structure is modeled at the level of the common latent state factors:

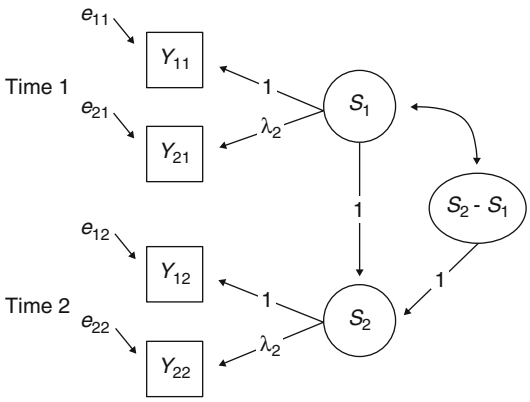
$$S_t = \beta_{0t} + \beta_{1t} S_{t-1} + \zeta_t, \tag{18}$$

where ζ_t is a latent residual (disturbance) variable. Since the autoregression is now modeled at the level of error-free latent variables, true change is no longer confounded with measurement error and can be more appropriately modeled than in the AR model with observed variables. In extended AR models, several constructs are considered simultaneously, so that *cross-lagged effects* can be analyzed (e.g., Hertzog & Nesselroade, 1987). In case of an imperfect autoprediction [i.e., whenever $\mathrm{Var}(\zeta_t) > 0$], cross-lagged effects can be examined to find out whether other constructs account for changes in the construct.

LC Models

Consider two common latent state variables measured at two different time points ($t = 1, 2$). Without making any additional assumptions, the time-two latent state variable, S_2, can be decomposed into the time one latent state variable, S_1, plus the deviation of S_2 from S_1:

$$S_2 = S_1 + (S_2 - S_1). \tag{19}$$



Longitudinal Structural Equation Modeling, Fig. 3 LSC model with time-invariant loadings λ_i for two observed variables measured at two time points

The (mathematically trivial) decomposition in Eq. 19 allows us to introduce and analyze *latent state change* (LSC) variables in LSEM (see Fig. 3). The LSC variable $(S_2 - S_1)$ represents individual differences in true state change (i.e., changes in true quality of life not contaminated by measurement error) between time point 1 and time point 2 and can be analyzed like any other latent variable in LSEM. Individual values on the LSC variable are the individual true state change scores. Steyer, Partchev, and Shanahan (2000) presented a baseline and a neighbor change version of the LSC model. These versions differ with respect to whether change is modeled relative to a baseline occasion of measurement (e.g., the first time point) or between adjacent time points (neighbor change version).

LC models can also be formulated on the basis of the latent trait variables defined in LST theory (see Eq. 6), leading to *latent trait change* (LTC) models (Eid & Hoffmann, 1998; Steyer, Krambeer, & Hannöver, 2004). Assume that there are four measurement occasions with four latent state variables S_1, S_2, S_3, and S_4 and that we are interested in trait change between the first two and the last two measurement occasions (e.g., an intervention or other event could have taken place between time 2 and time 3 that caused trait change). By making the assumption that S_1 and S_2 measure the same common latent trait factor, $T_{(1,2)}$, and S_3 and S_4 measure the same common latent trait factor, $T_{(3,4)}$, we can examine LTC in terms of the LTC variable $(T_{(3,4)} - T_{(1,2)})$. This variable can be introduced by means of the following unrestrictive decomposition:

$$T_{(3,4)} = T_{(1,2)} + (T_{(3,4)} - T_{(1,2)}). \quad (20)$$

In contrast to Eq. 19, Eq. 20 focuses on change in latent trait values (see Fig. 4).

It should be noted that, in general, a proper interpretation of LSC and LTC variables is only possible if the latent state and trait variables have the same origin and units of measurement across time. Therefore, strong invariance of the measurement model across time (invariant loadings and intercepts) is required (see Eq. 17). In addition, in LTC models, measurement invariance across occasions needs to hold also for the latent trait factors.

LGC Models

In LC models, individual differences in change or growth over time are considered, yet individual trajectories are not restricted to follow any particular shape. In LGC models, individual growth trajectories are usually restricted to follow a specific mathematical function (e.g., linear or curvilinear trajectories). First-order latent growth curve models use a single observed variable per measurement occasion (see Fig. 5). Assuming linear growth, each observed variable Y_t depends on the initial (time 1) latent state factor S_1 and the LSC factor $(S_2 - S_1)$ that reflects the difference between S_2 and S_1 (see Eq. 19):

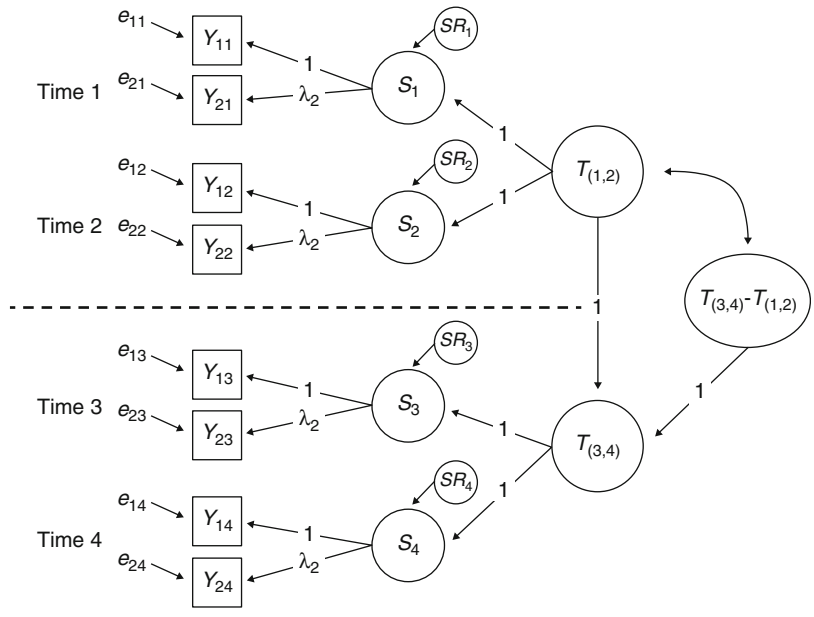
$$Y_t = S_1 + (t-1)(S_2 - S_1) + e_t, \text{ for } t = 1, \ldots, U, \quad (21)$$

such that for four time points ($t = 1, 2, 3, 4$), we obtain

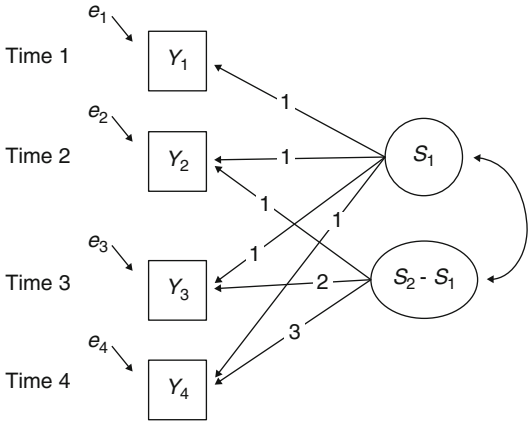
$$Y_1 = S_1 + e_1, \text{ for } t = 1, \quad (22)$$

$$Y_2 = S_1 + (S_2 - S_1) + e_2, \text{ for } t = 2, \quad (23)$$

$$Y_3 = S_1 + 2(S_2 - S_1) + e_3, \text{ for } t = 3, \quad (24)$$



Longitudinal Structural Equation Modeling, Fig. 4 LTC model with time-invariant loadings λ_i for two observed variables measured at four time points

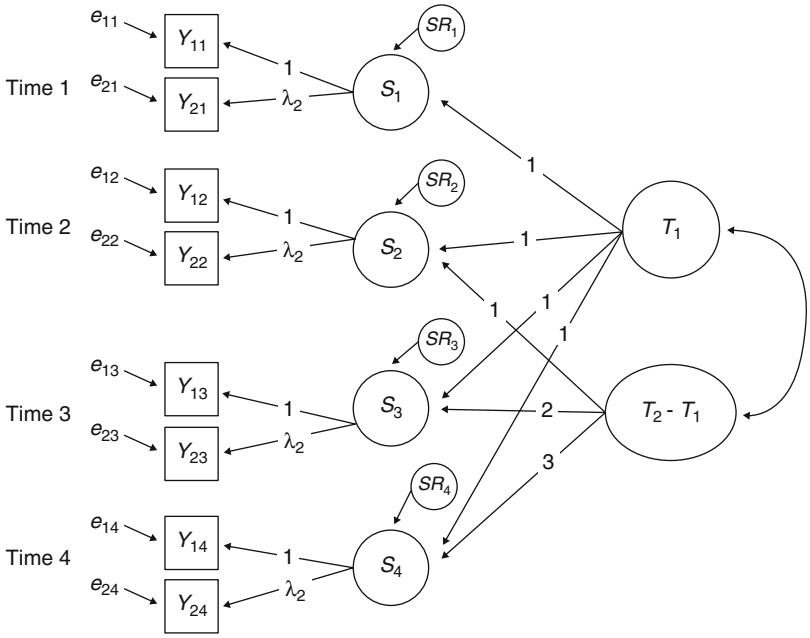


Longitudinal Structural Equation Modeling, Fig. 5 First-order linear LGC model for a single observed variable measured at four time points

$$Y_4 = S_1 + 3(S_2 - S_1) + e_4, \text{ for } t = 4. \quad (25)$$

The loadings of the indicators on the LC factor are fixed to specific values (here to $t - 1$, respectively) to reflect the assumption of linear growth. Note that in this example we assume equal spacing between measurement occasions, so that the loadings on the LSC factor are fixed to 0, 1, 2, and 3 for $t = 1, 2, 3$, and 4, respectively. In the context of LGC models, the factor S_1 is often referred to as an *intercept factor* or *random intercept*, because its values are the individual true scores at the origin of measurement (which is often time one). The LSC factor $(S_2 - S_1)$ is often referred to as a slope or shape factor, because its values indicate the individual growth rate (or steepness of the individual growth trajectories). The variance of S_1 indicates to which degree individuals vary in their initial true values. The mean of S_1 gives the average true score at time 1. The variance of $(S_2 - S_1)$ refers to the amount of true individual differences in linear change over time. The mean of $(S_2 - S_1)$ gives the average slope across all individual growth trajectories.

First-order LGC models have similar limitations as AR models with observed variables: They do not properly separate measurement error from true state residual variability and do not allow testing the assumption of measurement invariance over time. Second-order LGC models solve these problems by considering multiple indicators (at least two) at each measurement occasion (McArdle (1998) see Fig. 6). Second-order LGC models can be formulated as latent trait change models on the basis of LST theory. Consider two common latent state factors S_1 and S_2. According to LST theory, each latent state



Longitudinal Structural Equation Modeling, Fig. 6 Second-order linear LGC model for two observed variables measured at four time points

variable can be decomposed into a latent trait and a latent state residual component (see Eq. 2). Hence, we can rewrite S_1 and S_2 as

$$S_1 = T_1 + SR_1, \tag{26}$$

$$S_2 = T_2 + SR_2. \tag{27}$$

A latent trait change variable $(T_2 - T_1)$ can be introduced by means of the following unrestrictive decomposition (cp. Eq. 20):

$$T_2 = T_1 + (T_2 - T_1). \tag{28}$$

A second-order linear latent growth curve model for $t = 1, \ldots, U$ measurement occasions can then be written as

$$S_t = T_1 + (t-1)(T_2 - T_1) + SR_t, \tag{29}$$

such that for four time points ($t = 1, 2, 3, 4$), we obtain

$$S_1 = T_1 + SR_1, \text{ for } t = 1, \tag{30}$$

$$S_2 = T_1 + (T_2 - T_1) + SR_2, \text{ for } t = 2, \tag{31}$$

$$S_3 = T_1 + 2(T_2 - T_1) + SR_3, \text{ for } t = 3, \tag{32}$$

$$S_4 = T_1 + 3(T_2 - T_1) + SR_4, \text{ for } t = 4. \tag{33}$$

By combining Eq. 29 with Eq. 17, we obtain the measurement equation for the observed variables, again assuming strong measurement invariance over time:

$$Y_{it} = \alpha_i + \lambda_i T_1 + \lambda_i (t-1)(T_2 - T_1) + \lambda_i SR_t + e_{it}. \tag{34}$$

A comparison of Eqs. 21 and 34 shows that from the perspective of LST theory, first-order LGC models are special kinds of LSC models, whereas second-order LGC models are special kinds of LTC models. This has important implications for practical applications, as we may often be interested in trait change rather than state change. The above derivations show that from the perspective of LST theory, second-order growth curve models are more appropriate if one wants to study trait changes, because they clearly separate trait change from state residual influences, whereas such occasion-specific variability is confounded with measurement error in first-order LGC models. Unless there are good

reasons to assume that a construct is purely "trait-like" (i.e., that there are no situation-specific influences), the second-order LGC model is more appropriate to model change over time than the first-order LGC model (Geiser, Keller, & Lockhart, in press).

Hybrid Models

Hybrids of the above modeling approaches have also been presented. Tisak and Tisak (2000) combined LST models with LGC models. Bollen and Curran (2004) presented LGC models that include autoregressive effects. Extensions of LST models to LST models with autoregressive effects are discussed in Cole et al. (2005). Eid et al. (2012) presented a longitudinal modeling framework that integrates latent state-trait, latent autoregressive, and latent growth components in a single model and allows for heterogeneity among the indicators of the latent variables.

Method Effects

Longitudinal studies that use multiple indicators at each time point often have to deal with indicator-specific method effects over time due to using the same indicators repeatedly (e.g., Sörbom, 1975). Geiser and Lockhart (2012) as well as Steyer et al. (2012) discuss different approaches for modeling indicator-specific method effects in the context of LST models. Geiser, Eid, Nussbeck, Courvoisier, and Cole (2010) present an approach to modeling method effects in an application of LSC models.

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Cross-References

▶ Latent Growth Curve Modeling
▶ Method Effects

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Longitudinal Validity

► Responsiveness to Change

Long-Term Changes in Well-Being

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Synonyms

Change, sustainable; Permanent changes in quality of life; Well-being, stability

Definition

Over time, the level of momentary ► well-being fluctuates around a stable level of habitual well-being (also known as trait SWB, chronic SWB, set point, or dynamic equilibrium) due to situation-specific influences (Eid, 2008). Long-term changes are distinct from these transient fluctuations in two ways: (a) They affect the habitual level of well-being and (b) they persist over long time periods of at least several months. Long-term changes can be triggered externally (changes in life circumstances) and internally (changes in activities) (Lyubomirsky, Sheldon, & Schkade, 2005).

Description

For many decades, the field was dominated by theories suggesting that long-term changes in well-being are not possible. For instance, ► adaptation-level theory (Brickman & Campbell, 1971) predicted that people adapt quickly and inevitably to any changes in life circumstances. Subsequent authors proposed that the habitual level or set point of well-being was determined by heritable dispositional traits such as extraversion or neuroticism (Headey & Wearing, 1992). An important implication of this theory is that long-term changes are virtually impossible and people are stuck in the notorious hedonic treadmill (Brickman & Campbell, 1971). Typically, two major empirical findings are cited to support this theory: (a) SWB is highly stable

over time, as shown by strong retest correlations and (b) changes in life circumstances have negligible effects on SWB (e.g., Diener, Suh, Lucas, & Smith, 1999; Myers & Diener, 1995). In the past decade, researchers have used representative longitudinal data to reexamine these findings. As will be shown in the following sections, these studies have led to some important revisions of the notion that well-being cannot change.

Stability of Well-Being

In general, the stability of well-being decreases with increasing time lags between the measurements, but even for very long time spans, the estimated stability stays well above $r = .20$ (Fujita & Diener, 2005). Using advanced ▶ structural equation models (Eid, 2008), Lucas and Donnellan (2007) estimated that stable trait effects account for 34–38 % and moderately stable autoregressive effects account for 29–34 % of the total variance in life satisfaction. These figures indicate that although life satisfaction is generally stable, a significant portion is susceptible to situation-specific influence and can therefore change. In another notable study, Fujita and Diener (2005) focused on mean-level changes within individuals instead of stability coefficients that reflect the stability of the rank order between individuals. They found that over a 10-year period, the average level of life satisfaction decreased significantly for 24 % of the participants and increased significantly for 6 %. Thus, for most people, life satisfaction was stable, but for a significant minority, it changed. In sum, these studies indicate that SWB is indeed a stable construct, but this does not imply that long-term changes are impossible.

Changing Life Circumstances

Life circumstances encompass a person's current financial situation (e.g., income, debts), occupational situation (e.g., employment status), and social situation (e.g., marital status, number of friends). Changes in these life circumstances can occur at a specific moment in time (i.e., time-discrete ▶ life events such as marriage or job loss) or occur over a prolonged period of time (changes in the number of friends). Previous research has mainly focused on the effects of life events on SWB because their time-discrete nature allows a direct assessment of the initial reaction and subsequent ▶ adaptation to this event. In a series of studies using long-running panel data, it was found that life events such as unemployment, widowhood, and the onset of a disability can lead to persistent decreases in well-being (Lucas, 2007). Not all life events, however, affect well-being to the same degree: On average, people adapt to marital transitions such as marriage or divorce within a couple of years (Luhmann, Hofmann, Eid, & Lucas, 2012).

Another important line of research focuses on the effects of income on SWB. Although income is moderately correlated with SWB (Howell & Howell, 2008), most longitudinal suggest that changes in income do not lead to long-term changes in well-being (e.g., Marks & Fleming, 1999).

Changing Behaviors

An increasing body of research suggests that certain activities and behaviors can lead to long-term changes in SWB. Some examples for activities that have been found to enhance well-being are feeling and expressing ▶ gratitude, being helpful and supportive towards other people, and setting ▶ life goals (Lyubomirsky, 2007). These types of activities might also be useful to accelerate adaptation to negative life events and attenuate adaptation to positive life events (Larsen & Prizmic, 2008).

Individual Differences

A consistent finding in most longitudinal studies on life events is that people differ significantly in how they react and adapt to life events. In stress research, individual differences have often been associated with differences in the available resources (Hobfoll, 2002). These resources can be tangible (e.g., financial and material resources), dispositional (e.g., neuroticism), or social (e.g., social support). With respect to the effects of life events, the specific context of the event plays an additional role. For instance, people tend to react less negatively to their second divorce than to their first divorce (Luhmann & Eid, 2009). In their model of affective adaptation,

Wilson and Gilbert (2008) propose that life events are more likely to lead to long-term changes if they are hard to explain, for instance, because they are novel, surprising, or uncertain. To sum up, individual differences in long-term changes can be attributed to multiple factors, and it is yet unclear which ones are the most relevant.

Affective vs. Cognitive Components of SWB

According to Diener's (1984) definition, subjective well-being comprises affective and cognitive components. Affective well-being (AWB) refers to the frequency of positive and negative affect; cognitive well-being (CWB) refers to the evaluation of specific life domains or of life overall. A recent meta-analysis suggests that both AWB and CWB are affected by life events, but these changes tend to be more persistent for CWB (Luhmann et al., 2012). Others have suggested that adaptation might take longer for ▶ eudaimonic well-being than for hedonic well-being (Waterman, 2007), but there are not yet enough longitudinal studies that measured both eudaimonic and hedonic well-being to examine this proposition. In conclusion, whether or not well-being can change persistently depends on which component of well-being is considered.

Conclusion

Overall, the current state of research indicates that well-being can change sustainably, at least for some people and under specific circumstances. Moreover, long-term changes are more likely for cognitive components of well-being than for affective components. It is currently debated whether these new empirical findings can be integrated into a revised version of the ▶ set-point theory (Diener, Lucas, & Scollon, 2006) or whether the set-point theory needs to be replaced altogether (Headey, 2010).

Cross-References

- ▶ Affective Component of Happiness
- ▶ Emotional Well-Being
- ▶ Hedonic Adaptation
- ▶ Life Satisfaction, Concept of
- ▶ Set-Point Theory

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Long-Term Unemployment, Rate of

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Definition

The rate of long-term unemployment is defined by the fraction of the currently unemployed who have been out of work for more than 1 year. The duration of the unemployment spell refers to the period during which the individual has been continuously unemployed. In other words, it consists of the total number of days starting from when the individual stops working and ending when the individual becomes employed or leaves the labor force. Different statistics may use different time frames in the definitions for long-term unemployment, such as 6 months or 2 years.

Description

According to Machin and Manning (1999), long-term unemployment considered a problem during the Great Depression of the 1930s. However, it only became a major issue in developed countries during the early 1980s. The long-term unemployment rate in Europe increased from 0.9 % in 1979 to 6.6 % in 1994. In the United States, the long-term unemployment rate has generally been lower (Siebert, 1997). Since then, considerable research has been carried out to understand its causes and consequences and to suggest the design of policies to reduce it.

Two causes of long-term unemployment that have been suggested are technological changes in the economy and the increasing importance of international trade (Krugman, 1994). These changes may introduce a discrepancy between the skills required for most economic activities and the abilities of the current labor force. Nevertheless, as argued by Siebert (1997), although the technological shocks suffered by Europe and the United States do not seem substantially different, their long-term unemployment rates have not followed a similar pattern. This seems to go against technological changes as a major explanation for the rise in long-term unemployment.

Consequently, most literature has focussed on the structural characteristics of the labor market, such as unionization, minimum wage legislation, unemployment benefits, or other governmental regulations, such as regulations on work time, layoffs, labor income taxes, and social security payments.

In fact, Siebert (1997) associates the different pictures of long-term unemployment in Europe and in the United States with the institutional changes in Europe that did not occur in the United States during that period. For instance, in most European countries, layoffs were made more difficult, the duration of unemployment benefits was increased, access to such benefits was made easier, minimum wages were also raised, and labor income taxes had to be raised to compensate for more generous welfare states, among other changes.

Atkinson and Micklewright (1991) survey several studies that found evidence for a positive relationship between unemployment insurance and the spell of unemployment. However, they highlight the small size of this effect and its lack of robustness and external validity. Ljungqvist and Sargent (1998) impute the higher long-term unemployment in Europe to increasingly generous welfare states, which affects the supply of labor. Other authors focus on elements affecting the demand for labor. For example, Bentolila and Bertola (1990) attribute long-term unemployment to European hiring and firing costs.

The consequences of long-term unemployment are the same as for unemployment itself. However, the longer the spell of unemployment, the more profound the effects. The economic costs are obvious: production lost in the economy, income lost for the unemployed, increase in public spending due to the drop in income tax revenues and higher expenses in unemployment benefits, and finally, a rise in income inequality.

A major concern is the effect of long-term unemployment on the psychological well-being of the unemployed. Following the pioneering work of Eisenberg and Lazarsfeld (1938), Darity and Goldsmith (1996) argue that long spells of unemployment may affect a person's outlook on life, their emotional frame of mind, their self-conception, their cognitive efficiency, their attitude toward work and participation in the labor force, possibly leading to depression, anxiety, low self-esteem, and difficult personal relations (with spouses, offspring, and friends). The authors also emphasize the effect that a low self-esteem can have in terms of finding a new job or labor productivity, which could explain the persistence of long-term unemployment. Mincer and Ofek (1982), for instance, study the effect of long spells of unemployment on the depreciation of human capital. They find that reentry wages are lower than those at the moment of leaving employment and that the greater the decline, the longer the duration of unemployment. The same authors suggest that articulating economic models with social psychology theories to quantify such effects is a promising avenue for future research.

Cross-References

- ▶ Anxiety
- ▶ Fear of Job Loss
- ▶ Human Capital
- ▶ Long-Term Changes in Well-Being
- ▶ Productivity
- ▶ Self-Concept
- ▶ Self-Efficacy
- ▶ Self-Esteem
- ▶ Unemployment

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Loss

- ▶ Bereavement

Loss Personal Performance

► Presenteeism

Loss Productivity

► Presenteeism

Love

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Synonyms

Affection; Attachment; Companionate love; Fondness; Infatuation; Lust; Passionate love; Romantic desire

Definition

A psychological and physiological state that entails the desire to be with another person.

Description

Introduction

Love is a universal human experience. It is viewed as a basic human emotion that may manifest itself in a variety of forms and lead to a variety of cognitive-affective responses and behaviors (Hatfield & Rapson, 1993). It can be experienced for many close others (romantic partner, spouse, parents, children, friends, etc.) and even for humanity and nonliving entities. Love has been defined by scientists in various ways, including as an emotion and a physiological state (Hatfield & Rapson, 1993).

Because of love's importance, people, too, have their own theories about love. When asked their beliefs about features central to love, people have consensus that some features (e.g., compassion, intimacy) are more central to love than others (e.g., feelings of euphoria; [Fehr, 1988]).

What Is Love?

Although love can be experienced for many types of close others, most of the scientific research on love has focused on the type of love experienced for romantic partners. Theorists have identified a variety of types of love. One of the first typologies of love developed in the scientific literature was the distinction between *passionate love* and *companionate love* (Sprecher & Regan, 1998). Passionate love is defined as a type of love that is characterized by an intense, physiologically arousing desire to be with another person (Hatfield & Sprecher, 1986). It has been most frequently measured with the Passionate Love Scale (e.g., "I possess a powerful attraction for _____," "I sense my body responding when ____ touches me."). Companionate love, or friendship love, is a less intense emotional experience that entails affection for those who are close in one's life (Sprecher & Regan, 1998). Companionate love is typically measured using various items from Rubin's (1970) Love Scale (e.g., "I care about ____," "I would greatly enjoy being confided in by _____").

Another love taxonomy was proposed by social psychologist Robert Sternberg. In his *triangular theory of love*, Sternberg proposed that love is composed of three components: passion, commitment, and intimacy (Sternberg, 1986). Specific combinations of these building blocks can form distinct love types. For example, a love that lacks passion and intimacy, but has commitment, is labeled "empty love." Love that has all three components is labeled "consummate love."

Another common classification of love was developed by social psychologist John Lee and later expanded by Clyde and Susan Hendrick. In this taxonomy, a person, based on his or her responses to the Love Attitudes Scale, is classified as possessing one of six distinct love styles: *eros* (passionate love; e.g., "My lover and I have the right physical 'chemistry' between us"), *ludus* (game-playing love; e.g., "I enjoy playing the 'game of love' with a number of different partners"), *storge* (friendship love; e.g., "The best kind of love grows out of long friendship"), *pragma* (logical love; e.g., "An important factor in choosing a partner is whether or not he/she will be a good parent"), *mania* (obsessive love; e.g., "I cannot relax if I suspect that my lover is with someone else"), and *agape* (selfless love; "I am usually willing to sacrifice my own wishes to let my lover achieve his/hers;" (Hendrick & Hendrick, 1986)). Recently, Ellen Berscheid (a well-known love researcher) suggested a newer classification that grouped love into four general distinct types: *romantic* love (passionate love), *companionate* love (friendship love), *compassionate* love (selfless, altruistic love), and *attachment* love (strong affectionate bond to another person; [Berscheid, 2010]).

Falling in Love

Two of the most significant predictors of falling in love are the desirability of the target (e.g., physical attractiveness) and reciprocal liking (i.e., the target of affection reciprocating affection back to the lover [Aron, Dutton, Aron, & Iverson, 1989]). The rate at which people fall in love is subject to individual differences. People fall in love at various speeds, including quickly (i.e., "love at first sight") or gradually (slowly). In one study that assessed the speed at which people fell in love, for example, about 40 % of people reported falling in love quickly whereas 34 % reported falling in love slowly (Riela, Rodriguez, Aron, Xu, & Acevedo, 2010). The speed at which someone falls in love may be related to the target's physical attractiveness – people who fall in love quickly are more likely to do so if the target of their affection is physically attractive (Sangrador & Yela, 2000).

Researchers have documented that people also vary in the prevalence of falling in love. Men may be more susceptible to falling in love than are women, whereas women may be more cautious about falling in love than may men (Rubin, Peplau, & Hill, 1981). Men have also been found to be more likely than women to experience passionate or game-playing love, whereas women have been found to be more likely than men to experience logical, friendship, and obsessive love (Hendrick, Hendrick, Foote, & Slapion-Foote, 1984). Other individual difference variables that predict the susceptibility of falling in love include low self-esteem and an insecure attachment style, which both lead to a higher susceptibility to falling in love (Aron, Fisher, Strong, Acevedo, & Riela, 2006).

People believe that falling in love is a necessary precursor for committed relationships such as marriage. The association between love and marriage – people's preference for marrying someone whom they love – became stronger between the 1960s and the 1980s (Simpson, Campbell, & Berscheid, 1986). In research conducted over the past few decades, a large majority of both men and women view love as a prerequisite for marriage, although this association is much stronger in individualistic (e.g., U.S.A.) than collectivistic (e.g., India) countries; men and women would not want to marry someone whom they did not love, and see love to be important in maintaining a relationship (Levine, Sato, Hashimoto, & Verma, 1995).

People also associate love with lust. People in love are typically viewed by others as possessing sexual desire. Likewise, people who have sexual desire for one another are viewed as more likely to be in love (Regan, 1998).

Experiencing Love

Once a person falls in love, he or she may experience various physiological and psychological changes. Research using *functional magnetic resonance imaging* (fMRI) has found that when people who are in love are exposed to images of the target of their affection, they experience an activation of the *caudate nucleus*: a part of the brain's "reward system" (Fisher, Aron, &

Brown, 2005). Also, exposure to a target of love leads to increases in levels of *dopamine*, a neurotransmitter responsible for producing pleasure (Hatfield & Rapson, 2009). Evolutionary theorists posit that these positive experiences (both neurological and psychological [Fisher, Aron, & Brown, 2006]) evolved in humans (and perhaps other mammals) due to their reproductive advantages – romantic love facilitates pair bonding between mates (Buss, 1995).

Being in love may lead people to change their cognitions and behaviors. People who are in love are less likely to pay attention to attractive alternatives (i.e., people other than the current romantic partner who can be perceived as romantically desirable and available) than people who are not in love (Miller, 1997). Being in love can lead people to decrease their self-monitoring (i.e., self-control and self-observations guided by social situational cues [Snyder, 1974]) and increase their general self-efficacy (i.e., one's general confidence in ability to cope across a variety of situations [Scholz, Doña, Sud, & Schwarzer, 2002]) and self-esteem (Hendrick & Hendrick, 1988). Furthermore, people who fall in love are more likely than people who are not in love to possess a more diverse self-concept. That is, they use a more diverse array of words to describe themselves when asked: "Who are you today?" than do people who are not in love (Aron, Paris, & Aron, 1995). The diversification of the self-concept has been hypothesized to stem from the human motivation to expand one's self-concept by including others' self-concepts in one's own through the formation of relationships (Aron & Aron, 1986).

Experiencing love tends to spark oscillations in emotions. Typically labeled as the "emotional roller-coaster," passionate love is a strong predictor of experiencing both positive emotions (e.g., happy, joyful) and negative emotions (e.g., angry, frustrated), especially for men (Kim & Hatfield, 2004). Love, especially romantic love, when unrequited (i.e., unreciprocated), can lead to both the lover and the beloved to experience distress (Baumeister, Wotman, & Stillwell, 1993). Those who are in love but not loved in return may experience a decline in self-esteem, accompanied by shame and feelings of being misled by the target of their love. The beloved (i.e., the rejecter) may feel guilty and find the other's love nettlesome (Baumeister et al., 1993).

Another negative experience that may be related to love (especially passionate love) is jealousy: a negative affective reaction to a real or imagined rival threatening one's relationship (Buss & Haselton, 2005). Unlike companionate love, which involves a deep emotional connection between the partners, passionate love entails both sexual and emotional dimensions, which have also been found to be the primary cues that elicit jealousy (Buss, Larsen, Westen, & Semmelroth, 1992). Experiencing passionate (but not companionate) love is correlated with experiencing jealousy in both men and women (Sprecher & Regan, 1998).

Love and Quality of Life

Love – and the intimacy that it entails – has been found to positively influence well-being and health (Hatfied & Rapson, 2006). Intimacy, for example, can assuage the negative psychological impact of stress and facilitate self-disclosure (Laurenceau, Barrett, & Pietromonaco, 1998). Love has also been found to be related to patterns of sexual activity. People who are in love are more likely to give and receive oral sex, as well as to engage in sexual activity in general, compared to people who are not in love (Kaestle & Halpern, 2007). The presence of romantic love has been found to be associated with satisfaction in long-term relationships (Acevedo & Aron, 2009). Although passionate love typically wanes through the course of a relationship (Sprecher & Regan, 1998), if a couple is able to sustain passionate love (for example, by engaging in novel and arousing activities [Aron, Norman, Aron, McKenna, & Heyman, 2000]), then relationship satisfaction will increase. Companionate love has been found to be a strong predictor of subjective well-being in both collectivistic and individualistic cultural samples, especially for women (Kim & Hatfield, 2004). Like passionate love, however, companionate love can also decrease over time in relationships (Hatfield, Pillemer, O'Brien, & Le, 2008).

Conclusion

In this entry, we have discussed how scientists and laypeople define love, how people fall in love, and the effects that love may have on people, including their psychological and physical well-being. Love is a universal human experience that has been historically lauded in various works of art, music, and literature. The history of the scientific research on love, which has flourished over the last five decades, has seen several taxonomies that uniquely classified love into several categories. Love has been perceived as the epitome of positive human emotions, and indeed, empirical research on love has found consistent evidence that love can lead to numerous positive outcomes such as increased self-esteem, a more diverse self-concept, more satisfying relationships, and a higher overall well-being. Love, however, can have negative effects as well, including oscillation in mood, from both positive to negative emotions. Unrequited love can lead people to a lower self-esteem (if one is rejected), or feelings of guilt (if one is rejecting). Throughout the positive and the negative experiences, love is omnipresent in human lives, as it is the foundation to facilitate the social bonds that define what it is to be human.

Cross-References

- ▶ Attachment
- ▶ Lust

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Love and Care for Nature

► Nature Relatedness and Subjective Well-Being

Low Back Pain, Recurrent

► Chronic Low Back Pain

Low Birth Weight Babies

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Synonyms

Preterm born babies

Definition

Babies that have been born with a low birth weight of less than 2,500 g (up to and including 2,499 g), irrespective of gestational age. Low birth weight may be subdivided into very low birth weight (less than 1,500 g) and extremely low birth weight (less than 1,000 g). These infants are also often born (very/extremely) preterm.

Description

Being born with a low birth weight is an important predictor of newborn health and survival and may have long-term effects into adulthood on health and other functional outcomes (Hille et al., 2007; Milligan, 2010).

Health-Related Quality of Life as Outcome of Low Birth Weight

Several short- and long-term follow-up studies with cohorts of children, who were born with

a low birth weight or preterm, have included health-related quality of life (HRQoL) as an important outcome measure.

Short-Term HRQoL Outcomes in the First Years of Life

Studies that have measured short-term HRQoL outcomes have shown that very preterm of low birth weight born infants have less optimal HRQoL scores compared with a reference group from the normal population (Eiser, Eiser, Mayhew, & Gibson, 2005; Klassen et al., 2004; Stoelhorst, 2003; Theunissen et al., 2001). A study by Eiser et al. (2005) only found a difference between preterm and term infants on social HQoL but found no differences in the physical or emotional HQoL as reported by parents. A study on the HRQoL of Dutch preterm infants (Stoelhorst, 2003) using the TAPQoL (Fekkes et al., 2000) at 1 year of age showed significant differences with term infants on the stomach, lungs, and eating problems scales. However, on other domains, HRQoL scores of the preterm infants often scored optimal and were comparable with term infants. The stomach, lungs, and eating problems scales seem to represent typical problems that preterm infants encounter.

Long-Term HRQoL Outcomes into Adulthood

An international collaboration between the Dutch (POPS), German (BEST), and Canadian (McMaster) cohorts at teenage age showed that there were significant differences between the three cohorts in health-related quality of life (HRQoL), using the Health Utilities Index (HUI) questionnaire. This study showed that these differences were not related to differences in birth weight, gestational age, or cerebral palsy and that survival and response rates alone cannot explain these differences (Saigal et al., 2003; Verrips et al., 2008).

Other recent studies and systematic reviews that examined the health-related quality of life of adolescents and adults who were born preterm (Dahan-Oliel, Majnemer, & Mazer, 2011; Dalziel et al., 2007; Gray, Petrou, Hockley, & Gardner, 2007; Hallin & Stjernqvist, 2011; Saigal et al., 2006) showed that overall minor or no differences were found compared to controls, and that differences were mostly found within subgroups with a higher level of impairments. Parents did evaluate their child's quality of life lower, compared to controls. These reviews conclude that it is of interest to examine the underlying mechanisms.

Overall Conclusion

A systematic review by Zwicker and Harris (2008) concluded that the effect of preterm of low birth weight seems to diminish over time. The authors however warn that this might be influenced by child's report versus parent-proxy report, different definitions of HRQoL and adaption of individuals over time. At preschool age children who were born preterm showed significantly lower scores on physical, emotional, and/or social functioning. At teenage age parents rated their child's HRQoL poorer compared to the HRQoL as scored by the teenagers themselves. At adulthood differences in physical functioning remained; however, subjective HRQoL was similar to normal birth weight peers.

Discussion

Parent-Proxy Report of HRQoL

As described above, the fact that parents complete HRQoL instruments for their low birth weight infants has an effect of HRQoL scores. In a review, Hack (1999) warned that proxy HRQoL measurements can be influenced by parent's cultural, social, and educational background and their specific experience with children.

Ceiling Effect of Optimal HRQoL Scores

A recent study on the validity and reliability of the TAPQoL (Bunge et al., 2005) warns that a "ceiling effect" may limit the use of the TAPQoL to measure change in this group of children. A study that measured the effect of the basic developmental care and NIDCAP intervention for low birth weight babies did not find a significant improvement on HRQoL subscales of the TAPQoL questionnaire at 1 and 2 years of age corrected for prematurity, mainly because

many children received an optimal score of 100 (Van der Pal et al., 2008).

Screening Instrument HRQoL

HRQoL instruments might be used by pediatricians when screening the health status of low birth weight children's HRQoL, if pediatricians are willing to use HRQoL instruments as screening instruments (Baars, Van Der Pal, Koopman, & Wit, 2004).

Future Research

It is important to facilitate long-term follow-up measuring HRQoL outcomes and to combine the data of several cohorts to obtain a higher statistical power. When analyzing HRQoL outcomes in low birth weight infants, children, and adults, it is important to study underlying mechanisms.

Cross-References

- ▶ Ceiling Effect
- ▶ Health-Related Quality of Life Measures
- ▶ Proxy Assessments

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Low Earnings

▶ Low Income

Low Income

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Synonyms

Income poverty; Low earnings; Risk of poverty

Definition

Low income is an adjective typically referring to a household having few revenues within a given period. A low-income household is a household whose income is low in comparison to a certain standard: the standard can be set with respect to typical income levels in that country, the costs of satisfying basic needs, a household's or population's subjective assessment, or social rights.

Description

Income plays an instrumental role in enabling households and their members to reach ends such as well-being and development. Low income, in contrast, is associated with undesirable outcomes such as ▶ poverty, ▶ social exclusion, and underdevelopment. While income contributes to achieving quality of life, low income threatens it. Income has a central role in ▶ consumer choice theory in which a consumer's ▶ economic well-being is determined by her wants (preferences) and her haves (income, assets, and access to credit) (Deaton, 1992). Intertemporal choice models describe a consumer's ▶ consumption and saving's choices and thereby her past, current, and future well-being. But low income does not necessarily translate into low levels of well-being as assets and credit can be alternative sources of funding. Empirical research finds that a sustained low income, especially in combination with low levels of assets and limited or no access to credit, can result in low(er) levels of economic well-being, underdevelopment, and the intergenerational transmission of poverty.

In Amartya Sen's capability approach, the ultimate development goal is the expansion of substantive freedoms rather than the increase in economic well-being. In this approach, income is also relevant, but it is only one of a much wider range of factors (personal, family, environmental, and social) (Sen, 1999). These other factors are needed to understand why some persons and countries, despite having a higher average income level, are performing less in terms of ▶ human development.

Low income is thus used in contexts reflecting a problem or a concern: it is used as an indicator for measuring poverty, as a rationale for policy intervention, and as a screening tool for determining access to programs.

Low Income as a Poverty Indicator

For many households, income is the main funding source for satisfying economic wants and needs in industrialized and industrializing societies; a shortage of income is strongly associated with poverty. Income is therefore often used as a welfare indicator in studies that estimate and monitor the scope of financial or monetary poverty. Though there are many different methodologies of income ▶ poverty measurement, the measurement of a family's income and its comparison to a poverty line are the core ingredients.

Rowntree's study into the living conditions of the poor in York in 1899 was one of the first studies to use income as an indicator to estimate the percentage of poor; a family's income was compared to a poverty line reflecting a weekly sum of money enabling the family to attain a minimum subsistence level (Rowntree, 1901). If a family's income fell below the threshold, it was deemed poor. Since then the income poverty approach has become widely used by academics, national statistics offices, and advocacy groups, especially in countries with higher living standards. During the presidency of Lyndon Johnson in 1960s, the federal government of the United States adopted an official statistical definition of poverty which is still used today (Fisher, 1992): a household is poor when its market income falls below the money needed to attain a minimally adequate standard of living. The national bureau of statistics in Canada calculates the number of low-income persons using a low-income cut-off (LICO) reflecting the "income below which a family is likely to spend 20 percentage points more of its income on food, shelter and clothing than the average family" (Statistics Canada, 2009, p. 128). The European Union's at-risk-of-poverty indicator is constructed comparing a household's disposable income to a relative poverty threshold set at 60 % of national median income (Atkinson, Cantillon, Marlier, & Nolan, 2002). Though most low- and middle-income countries also report financial poverty statistics, they typically rely on household expenditures as a measure for household's resources rather than income (Ravallion, 1994).

While still very much in use, income poverty indicators have also received criticism. One category of critiques focuses on measurement problems: while the income poverty approach is seen as valuable to getting insights into the degree of monetary poverty, the concern is that problems with the measurement of a household's income and the poverty line lead to identification errors and thus unreliability of the estimates. Problems falling into this category are sampling errors in surveys, underreporting of income, nonmonetary or less common sources of income, methods used to take account of differences in the costs of living and household composition, and neglect of alternative sources of funding such as savings and assets. As a consequence, some groups are wrongly identified as poor (those with sufficient alternative financial means), while other groups are wrongly identified as nonpoor (those with higher needs such as persons with disabilities or chronic illness), and some population groups are not or underrepresented in the estimates (homeless persons, persons living in institutions). Another category of critiques is more fundamental because it questions the ability of income poverty indicators, and that of monetary poverty indicators in general, to provide sufficient insight into such a complex and multidimensional phenomenon as poverty. The core argument is that income represents only a means to an end: though it is an important instrument in attaining and expanding living standards, well-being, and ▶ capabilities, it does not tell us whether such outcomes are indeed achieved nor is it the only instrument or constraint influencing such achievements. Therefore, income poverty indicators are now increasingly supplemented with multiple poverty indicators, including multidimensional poverty indices.

Low Income as a Rationale for Policy Intervention

Industrialization is accompanied by a process of profound structural change in societies' values and ways of life. During the industrial revolution in Western Europe, the supply of labor in exchange for a monetary wage became the main, if not, only available strategy to satisfy economic wants and needs for a growing part of the population. At the same time, traditional mechanisms of solidarity and responsibility further eroded. The increased dependency on wages, also called commodification of labor, strengthened the cash nexus between labor supply and living conditions: low income, be it because of low wage or the inability to be active on the labor market, became an important factor associated with poor living conditions (Esping-Andersen, 1990).

During the nineteenth and twentieth century, low income increasingly became a rationale

for state intervention in the form of labor market regulations (such as working hours, child labor, safety standards), social insurance (covering social risks such as old age, disability, sickness, unemployment, and maternity), and social assistance (such as welfare payments, housing subsidies, food stamps for low-income households). Also coined as welfare states, these social protection arrangements constituted new, state-led, social safety nets. Access to social protection became a social right in many countries, and the arrangements contributed to a de-commodification of labor. Achieved levels of de-commodification differ widely between countries and over time and depend on the structure and generosity of the arrangements.

Low Income: A Screening Tool for Determining Access to Programs

Low income is further used as a criterion that households need to have in order to qualify for poverty-reduction programs. Particularly in developed countries, income testing is an important policy instrument to target poverty-reduction initiatives such as welfare payments, housing subsidies, food stamps, and tuition waivers to poor households (i.e., the target population). The income test is usually only one of several eligibility criteria, but, from a policy delivery perspective, it is the key instrument helping policymakers to concentrate spending on groups that are most in need. Rather than spreading scarce government resources thinly over the population through universal programs, targeted initiatives promise cost-effectiveness because they involve spending more on vulnerable groups with fewer spillages. However, targeted programs also carry costs as screening is more expensive and targeting mistakes are made. The trade-off between the costs and benefits of targeting versus those of universal programs has been at the center of an ongoing debate between proponents and opponents of targeted programs (Notten & Gassmann, 2008). In developing countries, targeting is also an important policy practice by governments, but income testing is typically replaced by other targeting instruments such as proxy means testing, geographical targeting, and self-selection (Coady, Grosh, & Hoddinott, 2004).

Cross-References

- ▶ Capabilities
- ▶ Consumer Choice
- ▶ Consumption
- ▶ Economic Well-being
- ▶ Human Development
- ▶ Low Income Cut-Offs (LICOs)
- ▶ Poverty
- ▶ Poverty Lines
- ▶ Poverty Measurement
- ▶ Relative Poverty Rate
- ▶ Welfare State(s)

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Low Income Cut-Offs (LICOs)

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Definition

LICOs are a set of income thresholds estimated by Statistics Canada to help identify Canadians who are likely to be substantially worse off than the average. Statistics Canada uses LICOs and other low income measures to generate various low income indices or statistics. These statistics help researchers to study the characteristics of relatively worse-off families in Canada and to report important trends and changing compositions of low income families and individuals (Fellegi, 1997). Because being worse off than the average does not necessarily mean that one is poor, Statistics Canada emphasizes that the LICOs are not a poverty line. Nevertheless, many researchers and practitioners often treat them as Canada's de facto poverty line.

Description

Besides the LICOs, Statistics Canada also produces the ▶ Low Income Measures (LIMs) and the ▶ Market Basket Measure (MBM) as alternative low income lines. LICOs are the oldest of the three. The first set of LICO thresholds was introduced by (Podoluk, 1968). It consisted of five income values for families of sizes from 1 to 5 or more persons, living in city centers with 15,000 or more residents. The thresholds were calculated using data from the 1959 Survey of Family Expenditures (FAMEX). The data showed that families of different sizes allocated, on average, about 50 % of their income on food, shelter, and clothing in 1959. The LICO methodology assumed that when family's expenditures on these necessities were significantly above the national average – the "significance" parameter was arbitrarily chosen as 20 percentage points – the family is likely to live under straitened circumstances. Thus, the initial LICO thresholds were simply expected incomes of Canadian families who spent 70 % (=50 % + 20 %) of their incomes on food, clothing, and shelter.

The initial LICO thresholds were adjusted with the annual ▶ consumer price index (CPI) to account for the increase in the cost of living in subsequent years. However, this indexing procedure only maintained the real values of the thresholds over time. It "failed to take account of changing socio-economic conditions" (Special Senate Committee, 1971). Partly in response to this criticism, in 1973, Statistics Canada revised the LICOs using data from the 1969 FAMEX. This data showed that Canadian families on average spent about 42 % of their income on food, shelter, and clothing. Adding 20 percentage points to reflect the "significance" parameter, the new LICO thresholds were determined as the expected incomes for families who spent 62 % of their incomes on the three items.

There were two important differences between this revised version and the initial set of LICOs. On the one hand, there was a methodological change in the threshold calculation. Under the initial LICOs, families who spent 70 % of their incomes were first identified. These families were then grouped into families with 1, 2, 3, 4, and 5 or more persons, and the average income for each group was taken as the corresponding LICO threshold. The revised methodology starts with a regression model in which family spending on food, shelter, and clothing is the dependent variable and family income, family size, area (rural or urban), and region of residency are the independent variables. The fitted model is then used to calculate the expected incomes for families who spent about 62 % of their income on food, shelter, and clothing. On the other hand, the revised LICO methodology now classified families into seven sizes, from 1 to 7 or more persons. These families were crossed by five geographical areas (rural area, cities with less 30,000 residents, with 30,000–99,999 residents, with 100,000–499,999 residents, and cities with 500,000 or more

residents). Thus, the 1973 LICOs contained 35 thresholds.

Three more rebases of LICO thresholds have been conducted using data from the 1978, 1986, and 1992 FAMEXs, respectively, with the same methodology as that in 1973. Since spending on necessities would decline when the standard of living increases, as implied by Engel's law, the proportion of income spent on food, shelter, and clothing by the average Canadian family dropped from 38.5 % in 1978 to 36.2 % in 1986 and to 34.7 % in 1992. Correspondingly, 58.5 %, 56.2 %, and 54.7 % were utilized to calculate the revised thresholds in 1978, 1986, and 1992. Outside of these years, the LICO thresholds were adjusted by the CPI to account for inflation.

The LICO thresholds are just one side of the equation. In order to determine if a family lives under straitened circumstance, one needs to look at whether the income of the family is lower than that of the corresponding threshold. Historically, since data on after-tax income were not collected, Statistics Canada had only produced the thresholds based on before-tax income, with low income families being identified by comparing their before-tax LICOs and their before-tax incomes. With the 1986 revision, both before- and after-tax LICOs have been created. Since then, the production and the analysis of low income statistics have focused on comparing after-tax LICO thresholds and after-tax income.

Discussion

The demands for low income and poverty statistics and measures are strong in Canada. Using the LICOs, Statistics Canada has produced historically consistent low income statistics, while researchers and practitioners have employed LICOs and the corresponding statistics to examine the trends and evolution of low income and poverty in Canada. These exercises helped to keep poverty, particularly child poverty and poverty among seniors, lone mothers, and recent immigrants, on the agenda of policy makers. For example, in 1989, the Canadian parliament passed a motion to eliminate child poverty by the year 2000. Strategic plans and antipoverty legislation to address poverty, low income, and ▶ social exclusion have also been introduced at the provincial level more recently.

In order to better serve the users and continue to produce valuable low income statistics, Statistics Canada published a technical paper discussing methodological concerns and possibilities in low income measurement (Wolfson & Evans, 1989). Based on this study, a wide-ranging public consultation with respect to the LICO methodology and the corresponding low income statistics was conducted in the early 1990s. Statistics Canada was almost unanimously urged to continue to publish its low income analyses, and, in the absence of a generally accepted alternative methodology, the majority of those consulted urged Statistics Canada to keep on using its LICO definition (Fellegi, 1997).

While the consultation suggested that the LICO is widely accepted as a legitimate measure of relative deprivation, there exists long-standing criticism towards the LICOs. An example of the criticism of the LICOs is that of Christopher Sarlo who has suggested that "low income" measured by the LICO is ambiguous and meaningless because the LICOs are based on an arbitrary assumption, i.e., the 20 % parameter, and that they do not reflect the cost of living facing the poor (Sarlo, 1996). The criticism of the arbitrary assumption is not totally justified since all poverty and low income measures involve some degree of arbitrariness. As Osberg (2007) points out, the purpose of poverty measurement is "to compare actual or hypothetical social states in a way which is potentially relevant for public policy" and "(A)ny poverty identification methodology will have some Type I (non-poor incorrectly labelled as poor) and some Type II (poor incorrectly labelled as non-poor) identification errors." Mendelson (2005) also observes that the LICOs would be legitimate as long as one treats them as thresholds to gauge low income trends; it is when one uses them as poverty measure that serious problems arise.

Relative to the arbitrariness of the measure, the complexity of the LICO methodology might be more problematic, though this has not been the focus of much discussion in Canada. The fact is

that the vast majority of those who are interested in poverty and low income have little knowledge of how the LICO thresholds are created and why they are created, while for those who understand the methodology, questions abound. Why is the regression model specified in its current form? Why is the model estimated at the country level rather than across cities and regions? Why is spending on luxury items such as vacation homes and jewelry included in the necessities, while detergent, soap, paper towels, and bathroom tissue are excluded? Why are payroll taxes not excluded from the income against which the LICO thresholds are compared to identify low income families and individuals?

A more serious issue is that the current LICO thresholds are nearly 20 years old. The failure to rebase the thresholds is progressively threatening the relevance and credibility of the underlying low income statistics. The current thresholds are based on data from the 1992 Family Expenditure Survey. The spending patterns have likely evolved since then. In particular, the proportion of income spent on food, shelter, and clothing may have decreased further. A natural question to ask is whether it is still sensible to compare today's income with a threshold that largely represents the standard of living of almost 20 years ago. Statistics Canada attempted to rebase the LICOs in the late 1990s but found that a rebase of the thresholds was not necessary at that time. In addition, the household spending survey recently went through a major redesign, and it would be difficult to rebase the LICOs using the same methodology as was used in the past.

Cross-References

- ▶ Child Poverty
- ▶ Consumer Price Index
- ▶ Low Income
- ▶ Low Income Measures (LIMs)
- ▶ Market Basket Measure
- ▶ Poverty
- ▶ Social Exclusion

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Low Income Measures (LIMs)

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Definition

The Low Income Measures (LIMs) are a set of thresholds estimated by Statistics Canada that identify Canadians whose incomes are below half of the median of the adjusted income distribution. The adjustment is made such that economies of scale in consumption within a household are accounted for. Statistics Canada uses LIMs and other low-income thresholds to generate various low-income indices or statistics. These statistics help researchers to study the characteristics of relatively worse off Canadians and to report trends and changing compositions of low-income families and individuals (Fellegi, 1997).

Description

From the late 1960s through the late 1980s, Statistics Canada produced low-income thresholds

and low-income statistics using the ▶ low income cut-offs (LICOs). In the late 1980s, a wide-ranging public consultation led Statistics Canada to introduce the LIMs as a complement to the LICOs (Wolfson & Evans, 1989), and thereafter, low-income statistics based on LIMs were published as complementary measures to those based on the LICOs.

The original LIM thresholds had the following characteristics. First, income sharing was assumed to occur within an economic family. The economic family concept used by Statistics Canada was compatible with the definition of family within a household set out in United Nations (1998) which defines it as "those members of the household who are related, to a specified degree, through blood, adoption or marriage." Second, an arbitrary equivalence scale was chosen to account for scale economies in consumption. Under this equivalence scale, the oldest person in a family was counted as 1, the second oldest person was counted as 0.4, and thereafter, each additional member older than 16 was counted as 0.4, while each additional member 16 or younger, 0.3. When these values for different members are added up, one would obtain the "equivalent size" of a family. Third, the standard LIM threshold (threshold for a one-person family) was calculated as half of the median of the adjusted family income distribution. The adjusted income here was obtained by dividing family income by its equivalent size. The LIM thresholds for families of other sizes would be obtained by multiplying the standard threshold by the equivalent sizes of these families.

The LIM thresholds were revised in 2010 to reflect the evolving international practices in ▶ poverty and low-income measurements (Murphy, Zhang, & Dionne, 2010). The revision affected all three characteristics mentioned above. First, the current LIM methodology takes household rather than economic family as the unit of income sharing. This change allows economies of scale in consumption to be shared among individuals who live in the same dwelling. These individuals may or may not be related by blood, marriage, or adoption, but since they live in the same house or apartment, they are assumed to be able to enjoy some savings in consumption. Second, with respect to the equivalence scale, the revised LIM adopts the square root of household size scheme. This scheme has been employed by the OECD (2008) in recent years. Finally, in the calculation of the thresholds, instead of using half of the median of the distribution of *adjusted family income*, the current LIM, following recommendation of The Canberra Group (2001), uses half of the median of the distribution of *adjusted individual income* (obtained by dividing household income by the square root of the household size) as the standard threshold. The thresholds for households of other sizes are obtained by multiplying the standard threshold by the square roots of the household size.

Unlike the LICOs and the ▶ Market Basket Measure (MBM) thresholds produced by Statistics Canada, there is no need to index the LIM thresholds every year to account for inflation because the LIM thresholds are calculated annually according to the contemporary income distribution.

Statistics Canada produces three sets of LIM thresholds: one based on market income (earnings from employment, incomes from investments, and retirement pensions), one based on total or before-tax income (market income plus government transfers), and one based on after-tax income (total income minus federal and provincial income taxes). Correspondingly, different income concepts are compared with these thresholds to estimate the low-income statistics.

Discussion

The LIM methodology has some unique characteristics. (1) The LIM thresholds are based on the distribution of income. They are easy to estimate and the calculation needs only data on income and household size. (2) There is no country-specific consumption pattern to consider in determining the thresholds, and thus, the methodology can be easily adapted to compare economic well-being across different developed countries. (3) Under both the original and the revised LIMs, the thresholds are recalculated every

year. With annual and automatic rebasing, this indicator uses as a reference a contemporary level of the standard of living as reflected by individual income. (4) The LIM thresholds do not have any geographical variations. Canadians living in different provinces and regions (rural areas or cities of different sizes) all face the same thresholds as long as their households are of the same size, and hence, it is truly a national threshold. (5) The LIM methodology is simple and transparent involving fewer assumptions and arbitrary choices than with the LICO and the MBM.

But as with other measures, the LIM methodology is subject to criticism. One is that the LIM is a pure inequality measure and hence does not measure low-income per se. The LIM is certainly related to inequality, but itself does not measure inequality. By definition, an income inequality measure such as the ▶ Gini coefficient gauges the disparities of income of all members of a society. They tell us the share of income obtained by the rich as well as that by the poor. The low-income indices, on the other hand, tell us who the poor are, how many they are, and how poor they are. A related criticism is that the "poor" will always exist if the LIM is used. It should be clear that defining somebody as "poor" when his or her income is below half of the median is very different from defining the bottom x% of individuals as "poor." In the second case, it is true that the "poor" will always be with us. But in the first case, the criticism does not hold if a redistribution of income is implemented such that the median is preserved while income becomes discontinuous at half of the median. Under this scenario, nobody would be in low income after the redistribution while inequality persists.

The LIM methodology is also criticized due to its reactions to extreme circumstances. For example, when a natural disaster occurs such that income distribution shifts to the left proportionally, low-income statistics under the LIM would remain the same. It is also possible that the low-income rate in one region will increase due to increases in income in other parts of the country that bump up the thresholds, even though household income in the region in question remained the same. However, for the school of relative measures, these changes are just what are to be expected under relative lines. They may equally point out that absolute thresholds, such as the LICOs that are based on a 20-year-old standard of living, are no longer relevant for studying contemporary poverty.

The LIM thresholds and methodology are most often employed by academic researchers to study poverty issues in Canada. For example, Osberg and Xu (1999) compared poverty across Canadian provinces and between several developed countries. Similarly, Finnie and Sweetman (2003) investigated poverty dynamics. More recently, Veal (2008) examined poverty among senior Canadians. All those studies employed the LIM thresholds (or thresholds based on the LIM methodology). This is also indeed the aim of the LIMs – to study the economic well-being of individuals from the bottom portion of the distribution and to address issues related to ▶ social exclusion. To this end, the LIM is a useful alternative that can be employed to complement other measures such as LICOs and the MBM.

Cross-References

- ▶ Gini Coefficient
- ▶ Household Equivalence Scale
- ▶ Low Income
- ▶ Low Income Cut-Offs (LICOs)
- ▶ Market Basket Measure
- ▶ Poverty
- ▶ Social Exclusion

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Low Levels of Growth and Productivity in Chile

▶ Capability and the Middle-Income Trap in Chile

Low Vision and Quality of Life

▶ Visually Impaired Older People, Quality of Life

Low Vitality

▶ Fatigue

Low-Carbon Development

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Definition

Low-carbon ▶ development is a new pattern of development that aims to reduce carbon dioxide emissions as much as possible while not affecting the increase of economic welfare at the same time.

Description

Energy, especially fossil fuels, plays a vital role in driving economic growth and improving people's ▶ quality of life. However, burning fossil fuels will produce carbon dioxide (CO_2) emissions that have been widely regarded as one main factor responsible for global climate change. Although there are different opinions towards the issue of global warming, international communities have made substantial efforts in reducing national and global CO_2 emissions. Accordingly, a new development pattern, namely, low-carbon development, has been widely advocated by many countries.

Low-carbon development is a brand new concept and different people may interpret it in different manners. The definition given by EREC (2008) is "creating and using low carbon substitutes to fossil fuels, reducing emissions of GHGs significantly while at the same time ensuring ▶ economic growth and development and the enhancement of human welfare across the world." Mulugetta and Urban (2010) point out that low-carbon development refers to "utilizing less carbon to promote economic growth in the future." The study by Islam (2010) defines low-carbon development in Europe and Asia as "reducing CO_2 emissions as much as possible and ensuring the economic growth at the same time." Despite of the various understandings about low-carbon development, a common feature of them is to emphasize the reduction of CO_2 emissions while not affecting economic growth. Essentially, low-carbon development is a new representation form of ▶ sustainable development in the era of climate change.

Several concepts relevant to low-carbon development have often been cited. The most popular one is low-carbon economy, which was first proposed by the UK government in its Energy White Paper (2003) – "Our energy future: creating a low-carbon economy." Low-carbon

economy is an economic development path with the purpose of realizing global economic growth while restricting the increase of fossil fuel consumption and CO_2 emissions. Cranston and Hammond (2010) point out that low-carbon economy implies "balancing and harmonizing population growth, economy development and environmental protection." Low-carbon society is a concept that has often been quoted by Japan (JME, 2007). A low-carbon society is required to follow three principles, namely, minimizing all the sectors' emissions, pursuing a simple lifestyle with higher quality, and getting well along with the nature. The actions taken in a low-carbon society should be consistent with principles of sustainable development (Skea & Nishioka, 2008). People in a low-carbon society should prefer to using high-energy efficiency and low-carbon products and adopting low-carbon living and consumption styles. In addition to low-carbon economy and low-carbon society, low-carbon life is also a popular concept that has often been quoted. It refers to reduce energy consumption and CO_2 emissions in our daily life by promoting low-carbon lifestyles.

Since low-carbon development has received much attention in countries like China, some researchers have also attempted to evaluate the performance of low-carbon development. In this line, a popular practice is to construct low-carbon-related composite indicators for performance comparisons. To construct composite indicators, some quantitative techniques such as ▶ multi-attribute decision making (MADM) and ▶ data envelopment analysis (DEA) may be applied (Zhou, Ang, & Zhou, 2010). The Climate Change Performance Index developed and released by German Watch and Climate Action Network Europe is based on the simple additive weighting method, and its main purpose is to carry out an international performance comparison in the development of low-carbon policies (Burck & Bals, 2010). The analytic hierarchy process (AHP) method, a popular MADM technique, has often been used to construct composite indicators for evaluating the progress towards a low-carbon economy (Fu, Zhuang, & Gao, 2010). The study by Xiao and Fan (2011) provides a review and comparison of the existing indicators for measuring the performance of low-carbon development.

The underlying indicators used to construct the low-carbon-related composite indicators have some common features, which often include categories such as energy use, economic growth, low-carbon science and technology, and GHG emissions. The category of energy use consists of indicators such as total energy use, ▶ energy consumption per GDP (an ▶ energy efficiency indicator at aggregate level), and clean energy utilization rate. In the aspect of economic growth, the indicators are per capita GDP, proportion of low-carbon industrial output, etc. With regards to GHG emissions, indicators such as total CO_2 emission and CO_2 emission per GDP are often used. Despite the common features, there exist variations in the methodology used and the choice of indicators for constructing low-carbon-related composite indicators. It is therefore worthwhile to conduct research on standardizing the underlying methodology and indicator framework in constructing a meaningful low-carbon index.

Discussion

Low-carbon development is a new development pattern that aims to reduce CO_2 emissions while not affecting economic growth. The ultimate goal of low-carbon development is to achieve the sustainable development of environment, economy, and society. At economy level, low-carbon development helps to improve energy efficiency, advance clean energy research and deployment, and enhance energy security. Low-carbon life is a dispensable component of low-carbon development. Promoting low-carbon life will help to shift people from an energy-intensive lifestyle to a simple and low-carbon lifestyle.

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Low-Risk Prostate Cancer, Quality of Life and Active Surveillance for

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Synonyms

Active Surveillance: Expectant Management, Watchful Waiting

Definition

► Quality of life and active surveillance for low-risk prostate cancer: Quality of life regarding physical domains and ► anxiety and distress in men diagnosed with low-risk prostate cancer who are managed expectantly instead of radical therapy.

Description

Introduction

In the current era of overdiagnosis of prostate cancer (PC), active surveillance (AS) has emerged as a realistic alternative to radical treatment for a subgroup of patients. The strategy consists of selecting low-risk PC with a likely very favorable prognosis and strictly monitoring these tumors over time. Curative therapy remains an option when disease progression or risk reclassification occurs. AS delays or even completely avoids side effects of surgery or radiation therapy.

An expectant management is justified in a substantial number of currently diagnosed men. In these times of PSA screening, more tumors are being detected, of which relatively more are low risk. The natural history of these cancers is very favorable, even when clinically detected, and all currently available radical treatments have considerable side effects. The beneficial effect on hard endpoints of radical therapy for low-risk PC may be limited. The only randomized study did find a survival benefit for patients treated with radical prostatectomy when compared to men who were randomized to watchful waiting (cumulative incidence of death from PC at 15 years of 14.6 % versus 20.7 %). However, participants were mostly clinically diagnosed instead of after PSA screening, the disease stage and grade often were higher than the current criteria for AS, and the result was limited to men <65 years at diagnosis.

For physicians, the rationale behind AS may be obvious. However, for patients, their families, and friends, not treating a potentially lethal disease in a still curable stage may appear highly unreasonable.

In the situation in which the effect on morbidity or mortality of a specific treatment option can be considered to be small, the different effects on the Quality of life (QoL) and psychological

aspects may be decisive for treatment choice in men diagnosed with low-risk PC. These aspects are of importance at the moment of treatment choice of men diagnosed with low-risk PC eligible for AS, when comparing the impact of AS with radical treatments on physical domains and resulting QoL, anxiety, and distress and when evaluating supportive and educational interventions for men with low-risk PC on AS or diagnosed with low-risk PC.

Treatment Choice

Anxiety, distress, expectations, and beliefs play a role from the moment low-risk PC is diagnosed. Patients are confronted with many different treatment options, of which the impact on mortality is largely unknown in these malignancies with a favorable prognosis. The choice between radical therapy and expectant management is the most controversial and may have the most impact on QoL later. Our understanding of the decision-making process in this group of patients may be inadequate.

Only a limited percentage of men with low-risk PC who are eligible for expectant management actually choose AS (46.4 % low-risk PC, 10.2 % choose AS). A higher acceptance rate of AS of 57 % was found by Miocinovic in the Cleveland Clinic (Miocinovic, Jones, Pujara, Klein, & Stephenson, 2011).

The preferences for either surgery or nonsurgical options such as AS were dominated by patients' perceptions about treatment efficacy and the personal burden of these treatments (Zeliadt et al., 2010). Xu et al. interviewed 21 men diagnosed with localized PC on their treatment choice. The self-perception and beliefs about PC were influential in the treatment choice, as well as anecdotal experiences of friends and family (Xu, Dailey, Eggly, Neale, & Schwartz, 2011). Knowledge of PC and AS, peer-pressure, and demographical factors may be other important aspects (Van den Bergh et al., 2009; Van den Bergh, Essink-Bot et al., 2010).

The main reason stated by men who actively choose AS is they want to delay potential side effects of radical treatment (Van den Bergh, van Vugt et al., 2010; Van Vugt et al., 2011). The main reason to reject AS is anxiety for cancer progression to incurable stages (Steginga, Turner, & Donovan, 2008; Xu et al., 2011).

Surprisingly, many patients report not even being offered AS as a treatment option after diagnosis by their urologist (Gorin, Soloway, Eldefrawy, & Soloway, 2011). It is clear that the treating physicians play a decisive role in accepting AS as a treatment option, as was found in several studies (Davison & Goldenberg, 2011; Gorin et al., 2011; Van den Bergh et al., 2009; Xu et al., 2011).

It has been suggested that there is room for improvement in supporting men who are diagnosed with low-risk PC and also that men and their partners should be involved more in the decision-making process (Steginga et al., 2008). Decision aids positively affect the process of consultation and decision making (Isebaert et al., 2008). Such tools may be used in these patients who face the difficult choice between different treatments to provide insight in the disease, future risks, and treatment options. These interventions should minimize misperceptions of patients and physician biases (Zeliadt et al., 2010). A risk calculator for indolent disease, as applied by Van Vugt et al., can also support objective decision making in men diagnosed with low-risk PC (Van Vugt et al., 2011). AS was recommended below a fixed cut-off for the predicted chance of indolent disease. Most men followed these recommendations, but 29 % of the men who were advised to undergo active treatment chose AS instead.

Choosing a specific treatment is like choosing your political party during election time. For most a perfect choice does not exist; all options have their specific benefits and disadvantages. However, based on personal situation, some choices fit better than others. And everyone should be well-informed about the available options and their consequences.

Radical Treatments Versus Active Surveillance

The choice between AS and radical therapy impacts different aspects of QoL. Surgery or radiation therapy may give a patient a feeling of

control over the disease and certainty, but at the tradeoff of a potential worsening of physical health domains such as sexual, urinary, and bowel function. In contrast, AS spares these physical domains by delaying or completely avoiding radical therapy, but here the tradeoff may be that not actively treating the disease results in uncertainty, anxiety, and distress.

More effects on QoL of AS can be identified. In some patients that do show cancer progression during AS, the option for specific treatments that preserve health-related QoL (such as nerve-sparing RP) may be closed off due to the – by then more advanced – disease stage or grade. This can be hypothesized to have an unfavorable effect on physical domains, as well as on anxiety and distress levels. These potential negative effects should be considered when starting AS. The size of this subgroup of all men who start on AS, as well as the magnitude of this potential negative effect on QoL, should be explored by future studies.

Results of QoL studies within watchful waiting cohorts with palliative intent are not applicable to men on AS and will therefore not be discussed in this review.

Van den Bergh et al. followed 129 Dutch patients on AS within the PRIAS study using QoL questionnaires (Van den Bergh et al., 2009; Van den Bergh, Essink-Bot et al., 2010). When compared to the literature and other cohorts, anxiety and distress levels remained favorably low shortly after diagnosis and after 9 months of follow-up. Patients with a higher score on a neuroticism subscale of a personality questionnaire showed persistently higher anxiety and distress scores. These men may not be a priori bad candidates for expectant management of PC (they might be afraid to have, e.g., surgery as well), but might need special support and attention during AS. Vasarainen et al. assessed the health-related QoL of 124 men enrolled in the Finnish arm of the same PRIAS study using validated questionnaires at baseline and during follow-up (Vasarainen, Lokman, Ruutu, Taari, & Rannikko, 2011). General health-related QoL, erectile function, and urinary symptoms were analyzed and compared to the general male Finnish population. On short term after diagnosis, no disturbances in QoL were found. Surprisingly, scores on mental and physical domains were even better than the average male population, stratified for age. A "healthy-screenee" effect and selection bias might explain this. Both studies found that a switch from AS to radical therapy is not often due to anxiety or distress (0–17 %) (Van den Bergh, van Vugt et al., 2010; Vasarainen et al., 2011). This is in line with other AS cohorts (treatment in absence of disease progression 2–18 % with follow-up 22–82 months) (Cooperberg, Carroll, & Klotz, 2011).

Latini et al. found that after choosing AS, most patients were satisfied with the treatment choice and only few were afraid of cancer progression. Reasons for 105 men with PC on AS to switch to radical treatment included both medical reasons (PSA velocity) as well as psychological factors (cancer anxiety score) (Latini et al., 2007).

Kasperzyk et al. found that expectant management compared to immediate treatment was associated with QoL benefits in multivariate analysis: less urinary incontinence and impotence. Also, it was found that QoL outcomes in men who underwent delayed treatment after initially waiting were not worse than in men who underwent immediate treatment (Kasperzyk et al., 2011). Thong et al. compared 71 men on AS to similar men who had received radiation therapy, 5–10 years after diagnosis. Health-related QoL dimensions were similar. Worse scores were seen in the radiation therapy group on bowel function, bother with bowel function and erectile problems (Thong, Mols, Kil, Korfage, & van de Poll-Franse, 2010).

Arredondo et al. used the CaPSURE database to assess changes in QoL in men with low-risk PC on an AS-like strategy. The men on AS had better or similar health-related QoL scores compared to men without PC at the start of the study, although decreasing in time with age. This decrease in sexual function and other physical domains was quicker than could be explained by the aging process alone, and scores were lower than those of older men without PC (Arredondo et al., 2008). This finding was probably due to more comorbidities in the group of patients that

were considered eligible for expectant management in the early years of AS. Burnet et al. did not find treatment choice (AS versus radiotherapy with hormonal therapy) to be a significant factor for psychological distress in a group of 329 men with localized PC (Burnet, Parker, Dearnaley, Brewin, & Watson, 2007).

However, Wallace et al. found that men on an AS-like strategy are uncertain, resulting in a perception of danger and decreases in QoL (Wallace, 2003). Another evidence of a potential negative effect of AS was found by Fujita et al.; repeat biopsies as part of most AS protocols may have a negative effect on erectile function (Fujita, Landis, McNeil, & Pavlovich, 2009).

Hayes et al. used a decision analysis simulation model on hypothetical cohorts of men with low-risk PC to examine the QoL benefits and risks of AS. AS was associated with the highest quality-adjusted life expectancy when compared to radiation therapy, brachytherapy, or radical prostatectomy. This difference remained even so if the relative risk of disease-specific death of initial treatment versus AS was as low as 0.6 (Hayes et al., 2010). In a combined United States-Ireland group of 29 men, Hegarty et al. performed a quantitative, descriptive survey. Men on AS in the USA showed slightly higher levels of uncertainty than men in Ireland. Total affective and health-related quality of life scores were similar among AS participants in both countries, but subscale scores identified both similarities and differences (Hegarty, Wallace, & Comber, 2008).

Supportive and Educational Interventions

Supportive and educational interventions may be used to optimize the treatment decision process in men with low-risk PC or to decrease anxiety and distress during AS. Although adequate levels of knowledge of PC and realistic perceptions of the AS strategy were found in patients with early PC and on AS, patients may need extra information regarding their disease (Van den Bergh, Essink-Bot et al., 2010).

The self-management of uncertainty of men on AS was found by Oliffe et al. to consist of two strategies. First, men who intent on living a normal life positioned PC as benign through stoicism and solitary discourses. Second, men did something extra on their own initiative that complemented AS protocols and often collaborated with their wives to focus on diet as an adjunct therapy (Oliffe, Davison, Pickles, & Mróz, 2009). Men and their families may benefit from tailored AS psychosocial interventions.

Pickles et al. thoroughly reviewed the psychosocial needs of men on AS. Communication with the patient, patient education, and peer support groups were mentioned as strategies to reduce uncertainty and resulting anxiety. An active participation of the patient in treatment decisions and the management of their disease also might have a positive effect due to a sense of control (Pickles et al., 2007).

During AS, changes in lifestyle such as diet, exercise, and stress management may be initiated in order to improve the health-related QoL (Daubenmier et al., 2006). Peer support groups have been evaluated positively by patients and may also be implemented (Steginga, Pinnock, Gardner, Gardiner, & Dunn, 2005). However, peer support groups intended to provide emotional support might also have a negative effect, when men believe being pressured by the group to change treatment (Chapple et al., 2002).

Furthermore, cognitive-behavioral group intervention was also effective in improving health-related QoL, and these changes were associated significantly with intervention-associated increases in perceived stress-management skills (Penedo et al., 2004). Kazer et al. found a positive effect of an Internet intervention on helping men manage issues related to AS and improve QoL (Kazer, Bailey, Sanda, Colberg, & Kelly, 2011). Intervention by telephone calls from a nurse also has been found to positively affect the perceived QoL of expectantly managed PC patients (Bailey, Mishel, Belyea, Stewart, & Mohler, 2004).

Future Research

The decision-making process – including the role of personal beliefs and experiences and of relatives and physicians – in men diagnosed with low-risk PC should be further understood. Treatment propositions can then be adjusted to specific patients, and adequate support can be

provided by, e.g., decision aids. The subsequent effects on acceptance rates of AS should be monitored. The influence of physicians in treatment choice, including communication strategies to reassure patients, needs further study.

So far only a limited follow-up is available from non-randomized studies. As these studies mature, the QoL side studies will reveal more of the psychological impact of AS also on the longer term and on the subgroup of patients who switch to radical treatment later. The evolution of anxiety and distress after longer follow-up may show different outcomes than the current favorable short-term findings.

Furthermore, qualitative studies of men who switch to radical therapy due to nonmedical reasons may identify the motives of these men. If it is known which non-medical issues make men switch to radical treatment, these can be anticipated for during follow-up with interventional strategies. Effects on compliance with the AS protocol should be assessed.

Almost all current data on psychological aspects of AS are derived from non-randomized studies, i.e., participants are a self-selected group of men who chose AS. Future studies randomizing for treatment including AS in men diagnosed with low-risk PC such as the ProtecT study will therefore teach us more about the effects of AS from a different perspective (Lane et al., 2010). In these (future) studies, not only urinary, sexual, and bowel domains but also anxiety and distress levels and their predictors should be compared between different treatment modalities.

Conclusions

The most important reason for patients to accept AS is the delay of potential side effects; reasons to reject include fear of cancer progression to incurable stages. Objective decision or calculation aids may help actively involve these men in making a well-informed treatment choice. Factors such as personality should also be incorporated in providing tailored treatment.

Men who have selected AS score better on physical domains than those on radical therapy and do not seem to show high anxiety or distress levels on short term after diagnosis. Only few stop AS due to uncertainty or nonmedical issues. Longer-term effects are unknown and may show different results. Observations from randomized studies may also prove otherwise.

Patients on AS have found various ways of coping with their cancer. They seem to have adequate disease insight and a realistic perception of their treatment. Good results have been found of psychological support by telephone and Internet interventions, and contradicting results of peer support groups in men on AS.

As long as our methods of screening men for PC and our ways of risk stratifying PC are imperfect, the dilemma of diagnosing men with low-risk disease in whom it is uncertain which treatment is best will persist. AS may provide an (temporary) alternative and should be offered by their physician to all men diagnosed with low-risk PC. The underlying aim should be to radically treat the patients who would develop symptoms of their PC and spare others.

AS is a relatively new treatment strategy, scientific evidence is evolving which could strengthen the foundation of this strategy. Observations on the QoL effects and psychological aspects of this strategy are still scarce and short term, but may prove to be crucial factors in choosing and undergoing AS for patients and physicians.

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Van den Bergh, Korfage, and Bangma (2012).

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LPI

▶ Legatum Prosperity Index

LQI

▶ Land Quality Indicators
▶ Life Quality Index

LQLP

▶ Lancashire Quality of Life Profile

LQOLP

▶ Lancashire Quality of Life Profile

LSI-A: Life Satisfaction Index

▶ Life Satisfaction in the Oldest-Old

Lubrication and Sexual Functioning

▶ Sexual Functioning

Luck

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Definition

Success or failure apparently brought by chance rather than through one's ability or efforts.

Description

Dependent upon one's understanding of the word "apparently" in this definition, luck can be given two contrasting interpretations.

Luck 1: Random Luck

In an objective, rational sense, luck is equated with randomness and chance. Lucky events are in this sense completely unpredictable and uncontrollable. A team that scores by "pure luck" could equally well (or more likely) have missed the goal and cannot take much credit for winning. In psychological theories of attribution (Weiner, 1986), luck in this sense is classified as an external rather than internal cause, responsible for effects that cannot be influenced by the individual, and also as an unstable rather than a stable determinant, since its effects cannot be predicted. In locus of control scales (Lefcourt, 1976), luck is grouped together with fate, chance, and powerful others as external factors limiting people's possibilities of self-determination. Studies in this tradition have implied that luck attributions are detrimental for achievement motivation, persistence, and goal attainment, as most people presumably want to be in control of their lives.

Prediction and control is also a goal of science. Scientists often claim that all events are causally determined and that research should aim at revealing causal regularities rather than randomness. Yet some critics have objected that experts and laypeople alike tend to exaggerate the scope of controllable and predictable events, while the truth may be that important events both in our personal lives (Bandura, 1982) and in society (Taleb, 2007) can be ascribed, directly or indirectly, to fortuitous (lucky or unlucky) circumstances.

Luck 2: Magic Luck

In a more magic, nonmaterial sense, luck is perceived as a rather mysterious causal agent with an identity of its own. The statement "I believe in luck" does not simply mean that one knows that, from time to time, unforeseen things happen but rather that one believes that incidents "apparently" due to chance are actually due to a more meaningful process. The same ambiguity can be observed for other chance-related concepts like coincidences. If a meeting is "purely" coincidental, it cannot be attributed to anything else than chance, but people who say they "believe" in coincidences mean that influences beyond chance are involved, like fate, providence, or supernatural powers.

Beliefs in Luck

People's beliefs about luck and, specifically, their belief *in* luck have been studied within several domains, like sports, health, business, hunting, warfare, love affairs, and gambling. It appears that luck becomes an especially important issue in matters of vital importance, where there is considerable uncertainty involved. In such affairs, there will also emerge theories about luck and practices by which luck can to some extent be predicted and controlled. Such theories and practices have often been labeled superstitions.

For instance, in classic texts about gambling, a distinction was made between lucky situations and lucky persons (Steinmetz, 1870). According to the doctrine of the "maturity of the chances," one should refrain from gambling until the same outcome has appeared several times in a row, which presumably would increase the chances of an opposite outcome. Luck could also be attached to individual players. A gambler, who wins several times in a row, is "in vein" and will probably continue his streak of winning, until he has used up his quota of luck (or spoiled it by showing an improper attitude). The idea of luck perceived as distinct from chance in gambling was observed by Wagenaar and Keren (1988), who interviewed blackjack players about the relative role of chance and skill. It turned out that most of them considered luck as a third factor, which they felt was even more important than the other two.

In an attempt to control "external" luck, people in all culture have invented a number of magical practices, like rituals, invocations, sayings, charms, astrological calculations, lucky numbers, places, pieces of clothing, food, and other objects associated with success and conversely, ill omens associated with bad luck. Such superstitions do not have to be embedded in a coherent belief system. Schippers and van Lange (2006) found luck rituals in about 80 % of top athletes, especially before important events. And they seem to work – partly by alleviating tensions and partly by increasing self-confidence. Damisch, Stoberock, and Mussweiler (2010) demonstrated that activating luck beliefs and the presence of lucky charms substantially improved performance on several dexterity and cognitive tasks.

Many people have a picture of themselves as lucky persons, whereas few describe themselves as consistently unlucky. This seems to be a benign superstition. Individuals scoring high on the belief in good luck scale (Darke & Freedman, 1997) are more optimistic, have better self-esteem, and are less anxious and depressed than low scorers. Wiseman (2004) did a comprehensive study of people who described themselves as especially lucky or unlucky. He found that lucky individuals differed from unlucky ones in predictable ways. They were outgoing and made contacts with lots of people; they were open-minded, listened to hunches, grabbed opportunities, showed persistence, and were

committed to make the best out of every situation. In this way, they increased their chances for nice thing happening to them, even randomly, in much the same way as one's winning chances are increased by participating in many lotteries.

What Is a Lucky Event?

Regardless of one's views on the origin of luck, what do people mean by saying that they have been lucky? According to philosopher Nicolas Rescher (1995), people are lucky when positive outcomes happen to them against all odds. The more wonderful and the more improbable the outcome, the luckier you are. Similarly, a bad luck event is, by his definition, the occurrence of an improbable, negative event.

However, when people are asked to recall lucky events from their own life, these are not uniformly positive. They often involve dangers and accidents. The common denominator in all stories seems to be that what happened is contrasted with something worse that did not but could have happened, i.e., with close and worse counterfactuals. The closer and the worse this alternative outcome is perceived to be, the luckier you are (Teigen, 2005). For instance, when tourists were interviewed after the 2004 tsunami, nearly all of them spontaneously mentioned how lucky they had been (Teigen & Jensen, 2011). Thus, luck appears to depend on downward comparisons, either with less fortunate others or with easily imaginable alternative outcomes, often disastrous ones. Interestingly, when people are asked to recall instances of luck and instances of gratitude, they produce similar stories. To feel lucky and to feel grateful presuppose a realization of "it could have been different." In a summary of philosophical and psychological conceptions of luck, Pritchard and Smith (2004) arrived at a similar conclusion. An outcome is lucky (1) if it occurs in the actual world, but not in other, nearby "possible" (counterfactual) worlds, and (2) if it is significant to the agent concerned. These conditions emphasize the fact that events are not lucky or unlucky per se but require a comparison being performed in the mind of an individual.

Cross-References

▶ Locus of Control

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LUDI

▶ Land Use Diversity Index

Ludic Behavior

▶ Play Behavior

Lumbar Spine Surgery and Patient Activation

▶ Patient Activation: Utility in Elective Lumbar Spine Surgery

Lust

▶ Love

Luxembourg Income Study

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Brief History

In 1983, the Luxembourg Income Study (LIS), a database containing harmonized microdata from several high-income countries, was founded by two American academics – economist Timothy Smeeding and sociologist Lee Rainwater – and a Luxembourgish psychologist, Gaston Schaber. With support from the Luxembourg government, these three scholars launched LIS, in cooperation with a team of multidisciplinary researchers in Canada, Israel, Germany, Norway, Sweden, the United Kingdom, and the United States. Smeeding became LIS's first director and Rainwater its first research director.

From 1983 to 2002, LIS was a division of the Centre d'Etudes de Populations, de Pauvreté et de Politiques Socio-Economiques (CEPS), a research institute located in Luxembourg. During those years, LIS grew steadily, expanding from 7 countries to over 30. LIS also developed and launched its signature remote-execution system (known as "LISSY"), which allows registered researchers from all over the world to access the microdata from their home offices, to carry out (nonproprietary) social science research.

In 2002, LIS and its staff became an independent nonprofit institution, incorporated in Luxembourg. In 2005/2006, Smeeding and Rainwater retired from LIS. They were succeeded by Janet Gornick, a political economist and sociologist based in the United States, and Markus Jäntti, an economist based in Sweden. As of 2013, Gornick and Jäntti continue to direct LIS.

In 2011, the Luxembourg Income Study changed its official name to its long-standing three-letter acronym – LIS. (The name "Luxembourg Income Study" remains in use in reference to LIS's income microdatabase described below.) At the same time, LIS launched an entirely new website, changing its URL from www.lisproject.org to www.lisdatacenter.org, and it inaugurated an updated/revised cross-national data template as well.

Activities/Major Accomplishments/Contributions

Introduction

LIS – formerly known as the Luxembourg Income Study – is a microdata archive and research center dedicated to cross-national analysis. LIS's mission is to enable, facilitate, promote, and conduct cross-national comparative research on socioeconomic outcomes and on the institutional factors that shape those outcomes.

LIS is now home to two databases, the Luxembourg Income Study Database (originated

in 1983 and referred to as "LIS") and the Luxembourg Wealth Study Database (originated in 2007 and referred to as "LWS" – pronounced "loose").

The Luxembourg Income Study Database (LIS), under constant expansion, is the largest available database of harmonized income microdata collected from multiple countries over a period of decades. LIS, which contains variables at the household and person level, focuses on income data from both private and public sources. The LIS datasets also contain data on household characteristics, employment, and, in some cases, household expenditures and/or consumption. The LIS data are mainly used to study poverty, income distribution, and labor market outcomes.

The newer Luxembourg Wealth Study Database (LWS) is the only cross-national wealth microdatabase in existence. The LWS datasets focus on wealth data, including both assets and debt; they also contain household characteristics, labor market data, and, in some cases, behavioral variables. The LWS data, while still new, are gaining a base of users; these data have been used so far to study household wealth portfolios as well as the joint distribution of income and wealth.

A third database – the Luxembourg Employment Study (LES) – included harmonized labor market data at two time points, about 1990 and about 1995. After constructing those two waves of LES data, the LIS directors and staff decided not to extend the LES Database to later years. Instead, in response to data users' needs and preferences, LIS substantially expanded the labor market data contained within the LIS Database.

The main office of LIS, located in Luxembourg, houses the LIS and LWS Databases and a team of professionals who perform the essential roles of the organization: dataset acquisition and harmonization, documentation, technical and user support, instruction, and core administration. Many of the staff also conduct research using the LIS and LWS microdata.

The New York City office is a satellite located at the Graduate Center of the City University of New York (CUNY) and is home to LIS Director Janet Gornick, professor of Political Science and Sociology at CUNY. With a small staff, this satellite office is engaged in development work, graduate student instruction, and research.

Accomplishments and Contributions

LIS, the institution, has four overall goals:

1. To harmonize cross-national data, thus relieving researchers of this task, relying on an expert staff that carries out the harmonization work and provides support services for users
2. To provide a method allowing researchers to access these data under privacy restrictions required by the countries providing the data
3. To create a system that quickly allows research requests to be received and results returned to users at remote locations
4. To promote comparative research on the economic and social well-being of populations within and across countries

The LIS Database now includes data from more than 40 countries, from Europe, North America, Latin America, Australasia, the Middle East and North Africa, and Asia. The database contains over 220 datasets, organized into seven time periods (known as waves), spanning the years 1968–2008. The new and smaller LWS Database includes 18 datasets from 12 countries, spanning the years 1994–2006. For each of the databases, the list of countries and years for which data are available can be found online at http://www.lisdatacenter.org/our-data.

LIS provides access to the LIS and LWS Databases in three ways: via the remote-execution system ("LISSY"), the Web Tabulator, and the LIS Key Figures. Access through LISSY or the Web Tabulator requires registration. The LIS Key Figures are publically accessible and provide standard statistics based on the LIS Database.

LISSY is a remote-execution data access system for the LIS and LWS microdata. LISSY allows registered users to submit programs using common statistical software packages (SAS, SPSS, or Stata), while respecting the confidentiality restrictions imposed by certain countries.

The Web Tabulator is an online table-making tool that allows registered users to design and

generate cross-national descriptive tables without the need for programming. The "Web Tab" includes datasets starting from LIS Wave V, but does not presently include LWS datasets.

In addition, LIS has created two sets of national indicators based on microdata from the LIS Database. Registration is not required to use the Key Figures. The Inequality and Poverty Key Figures include multiple inequality measures, relative poverty rates for various demographic groups, and median and mean disposable household income. The Employment Key Figures by Gender display information about economic outcomes by gender as well as gender inequality in poverty and employment.

Extensive documentation for each dataset details technical aspects of the original survey, a record of the harmonization process, and institutional information on tax and transfer programs corresponding to the microdata variables. The LIS website also houses several complementary country-level databases, including a comparative welfare states database and a family policy database; these contain an array of country-level policy indicators. These country-level databases are widely used by LIS's microdata researchers, who often seek to link macro-level variables to microlevel outcomes.

The LIS and LWS (and the former LES) Databases have been used by over 3,000 researchers in many countries to analyze economic and social policies and their effects on outcomes including poverty, income inequality, employment status, wage patterns, gender inequality, family formation, child well-being, health status, immigration, political behavior, and public opinion.

Reports based on the LIS – and recently, the LWS – data have appeared in books, journal articles, and dissertations and are often featured in the popular media. Each completed study is published in the LIS or LWS Working Paper series, which currently contains more than 600 papers. The LIS website offers a Working Papers search engine, a complete set of abstracts, and most of the papers in full text.

In addition, LIS conducts annual training workshops that introduce researchers to the LIS and LWS Databases and to cross-national research on wages, income, employment, wealth, and social policy. Since 1988, over 500 scholars have attended the workshops. LIS also publishes a newsletter, which is regularly sent to over 3,000 recipients in 40+ countries. In 2010, LIS established a predoctoral and postdoctoral scholars program.

The Future

LIS's core goal over the next 5–10 years is to increase its data holdings. Traditionally, the LIS Database's income surveys have come primarily from high-income countries – with a concentration in Europe and North America. That said, datasets from a number of middle-income countries have been added recently (or are in the process of being added), including India, China, South Africa, Egypt, and several Latin American countries. One of LIS's main priorities, over the next 5 years, is to continue to increase the inclusion of middle-income countries, which will bring not only more economic diversity but more geographic diversity as well. A second core goal is to expand the LWS Database, by adding more countries and multiple points in time.

Cross-References

- ▶ Child Poverty
- ▶ Debt
- ▶ Gender Inequalities
- ▶ Income Distribution
- ▶ Income Redistribution
- ▶ Inequality in Quality of Life
- ▶ Low Income
- ▶ Policy Analysis
- ▶ Poverty
- ▶ Poverty Measurement
- ▶ Work Time

LVPMs

- ▶ Latent Variable Path Models