

The Factorial Composition and Weights for Subjective Component in Well-Being Index: Case Study in Giza Governorate, Egypt

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Abstract

The current research aims to review the concept of Subjective Well-Being (SWB) and its literature and to reveal the factorial construction of the subjective – component in the composite well-being index.

This main objective of this paper is studying the factorial structure by using of Exploratory Factor Analysis (EFA) and determination of the relative weight of each factor from factor analysis outputs.

To achieve the previous objectives we use a sample of 1500 women from Giza governorate, distributed equally in three regions: (Agouza represents an urban area, Manwatt represents a rural area, Abu Qatada represents a slum area). The results include the (EFA) of confidence in the psychometric measures and the reliability test of (Cronbach's alpha α) for the questions of the questionnaire suggested by the Organization for Economic Co-operation and Development (OECD) on the (SWB) of the sample

The study reached that, the use of the (EFA) of the components of the subjective-component revealed nine factors that explain (69%) of the variation. this is a good percentage.

Keywords: Subjective Well-Being, Exploratory Factor Analysis, Reliability, Weights

1. Introduction

The frequency and strength of passionate experiences such as happiness, joy, stress, and worry that making a person's life pleasant or unpleasant. Life assessment refers to ideas in people's minds, perceptions, and way of thinking (Kahneman & Deaton , 38, 2010). A variety of disciplines have shown growing interest in the accurate estimate of HWB [hedonic well-being], especially positive Domains of well-being (Kahneman & Krueger , 2006) (Krueger A. , 2009). Research has begun to delineate the neurobiological basis of hedonic well-being (Davidson, 2004) and to discern broad and important implications in areas such as health and society. In health research, positive influence has been found to predict response to illness and even survival among older men and women (Steptoe & Wardle , 2011). In the economic and societal arenas, there is a realization that traditional economic measures such as income provide a fuzzy and incomplete explanation of social wellbeing (Kahneman & Deaton , 38, 2010).

Subjective well-being (SWB) is usually defined as ‘a person’s cognitive and influential assessment of his or her life’ (Diener, Lucas, & Shigehiro, 2005). Subjective well-being is a multi-dimensional structure with three facets: cognitive, positive affect and negative effect. The cognitive facet represents what a person believe of his or her life and how satisfied and accomplish one finds his or her life. Affective or feelings facet characterizes how a person feels about their life for example, how happy, angry or anxious they usually are. Contrary to a prevalent view, positive and negative feelings about one’s life are not at the reverse ends of the same scale, and so, therefore, they should be treated as different facets (Huppert & Whittington, 2003).

Subjective well-being is a major contributor to quality of life and can be crystallized as a momentary state or as a relatively stable trait, depending on the time frame of the assessment interval Researcher (Diener & Seligman, 2004). And propose that any such preparation must include at least 3 components: it should be subjective, reflecting a concern for how the individual judges him- or herself; it must include positive indices of an individual's feelings toward life as reverse to negative ones ,and it should be global to include all areas of an individual's life. In sum, subjective well-being should be composed of three major structure: (1) the presence of positive affect, (2) the absence of the bad effect, and (3) high levels of life satisfaction.

2. Literature Review

2.1. Tripartite Model of Subjective Well-Being:

Subjective well-being (SWB) is a theoretical approach proposed by Diener which illustrates how people experience the quality of their lives and contains both feelings interaction and cognitive referee. Psychologists have defined happiness as a collection of life satisfaction and the proportional frequency of positive and negative affect. SWB, therefore, include moods and feelings as well as the assessment of one's satisfaction with general and specific areas of one's life. Concepts include by SWB include positive and negative affect, happiness, and life satisfaction.

2.2. Glance of Subjective Well-Being:

Subjective well-being (SWB) indicate how people experience and assessments their lives and specific domains and activities in their lives. Over the past ten years, interest in knowledge about SWB (also called “self-reported wellbeing”) has increased markedly among researchers, politicians, national statistical offices (NSO’s), the media, and the public. The value of this information lies in its expected contribution to supervision the economic, social, and health status of populations and in potentially informing policy decisions across these domains (Krueger A. , 2009); (Layard , 2006).

2.3. Evaluation of Subjective Well-Being:

Measures of evaluation of well-being are designed to capture the verdict of overall life satisfaction “self-reported wellbeing” or fulfillment; these judgments may be applied to specific domains of life, such as relationships, societal issues, health, education or occupation, as well as to overall evaluations. An example of a question phrased to measure evaluation of well-being—one recommended by (OECD, 2013) and depends on the World Values Survey—is “overall, how satisfied are you with life as a whole these days?” Although OECD has suggested a scale from 0 to 10 for this question (OECD, 2013, p. 254), different scales have been used for periodical guides of the question by other surveys, inclusive the UK Office for National Statistics (ONS), the French National Statistics Office, the British Household Panel Study, the Canadian General Social Survey, the German Socioeconomic, and the European Social Survey.

SWB is observed through the answers to the question “How satisfied are you with your life as a whole for the time being?” Answers range on a scale from 0 (extremely dissatisfied) to 10 (extremely satisfied), which is a widely based scale for measuring well-being (Krueger & Schkade, 2008) (OECD, 2013).

2.4. Organization for Economic Co-operation and Development Better Life Index:

In 2011, OECD Designed the Better Life Index, which focuses not only on the functioning of the economic system but also on people’s experiences and on living conditions (OECD, 2011).The OECD index identifies and translates wellbeing through three pillars– material living conditions, quality of life and sustainability. It assess the wellbeing of 34 member countries with the aim to provide information on the present and future well-being through 11 dimensions: housing, income, jobs, community, education, environment, governance, health, life satisfaction, safety and work-life balance (OECD, 2011) Also, its wellbeing framework focuses on people (individuals and households), wellbeing outcomes, distribution of well-being in the society, and evaluates both objective and subjective domains of wellbeing with the aim of permanently driving wellbeing (Durand, 2015). The index has been criticized for its composition of only developed countries. Yet, its interactive tool allows other developing countries to create their own Better Life Index and rank wellbeing issues in their countries (OECD, 2011) One of the key priorities of the index is to measure wellbeing and

progress through on-going research to enhance its wellbeing measure and link the existing gap between wellbeing and policy intervention (OECD, 2011) the subjective indicators of well-being tend to provide critical information about people's lives; they offer insights and evaluate the experience of individual's living conditions as well (OECD, 2013).

3. Conceptual Framework

Different theories have been developed by sociologists, statisticians and experts in various disciplines related to well-being about what constitutes well-being. But because well-being is a multidimensional concept, the curriculum differs in understanding its interrelationships across domains. Therefore, the convergence of theory at the level of results across the fields of economics, psychology, sociology, and aging, because these sciences have produced different theories is difficult, so this conceptual framework is developed by OECD. (OECD, 2013).

4. Research Problem

Although there are many composite indices to measure all the developmental aspects of countries and compare them, as well as across the regions of one state over different times, they neglect the subjective component in these indices. This prevents the achievement of the desired goals because they do not contain the subjective measurements of quality Human life and the surrounding psychological environment. These multiple variables are grouped into factors according to their degree of convergence. The relative weight of each factor must be taken seriously since weight is determined by the priority determinants of policy-making towards the development and improvement of low factors.

5. Research Importance

Information about Subjective well-being aims to obtain enough knowledge about people's daily experiences in their lives, based on their own reports, and includes many questions about people's satisfaction with the achievements in their lives in general, as well as a variety of daily recurring feelings, such as happiness, anxiety, tension, depression and sadness. The indicators of SWB through its products are the type of policy adopted by the state towards its population (Foundation, 2009). It is very important to distinguish between SWB and a more general measure of well-being that encompasses both objective and subjective elements in a single conceptual mold. (OECD, 2011) (OECD, 2013). There are many well-being concepts in a broader sense where well-being measures include the physical conditions of people such as income, wealth, jobs and housing, as well as other dimensions such as education, health, environmental quality, safety and social ties. (OECD, 2013). Therefore, this study is important

for shedding light on all of the above and the method of quantitative measurement of the subjective component and to ensure its safety methodically through exposure to Exploratory Factor Analysis (EFA).

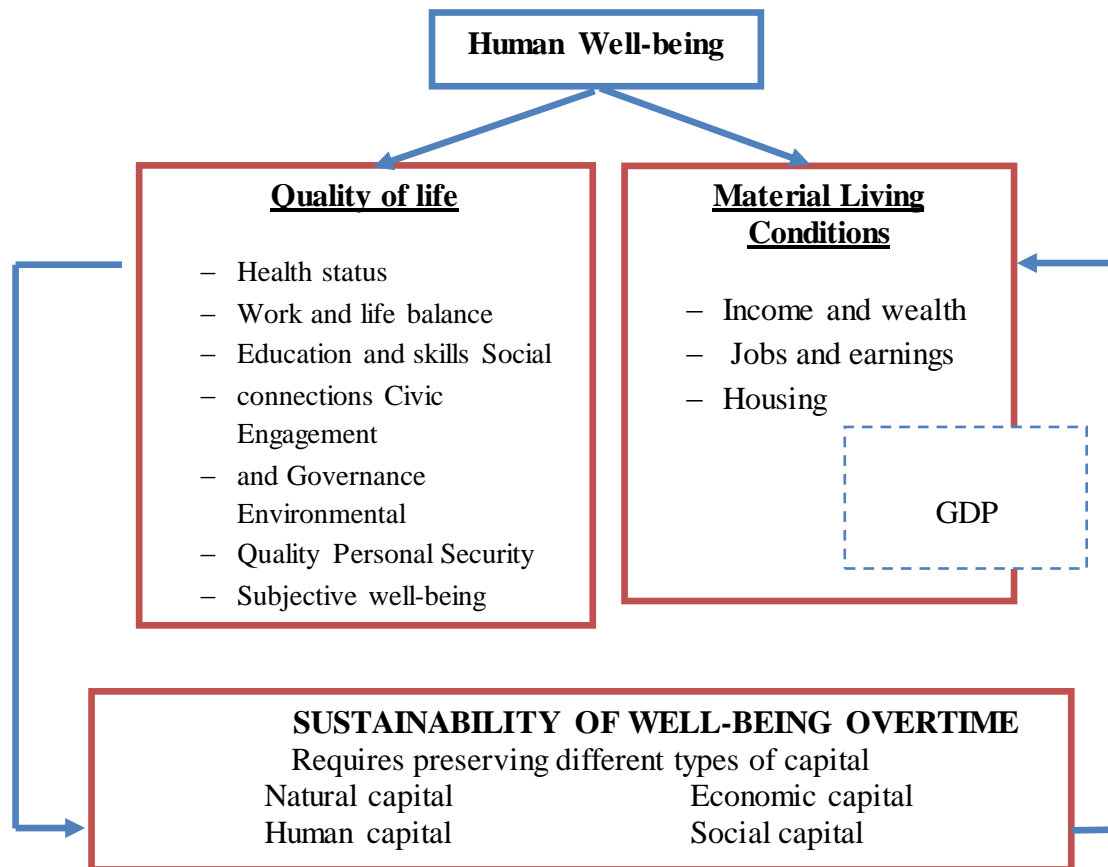


Figure 1: Framework for OECD well-being indicators, 2013 (OECD, 2013)

6. Study Objectives

The main objective of the study is to study the Factorial Structure of the subjective component of the Composite Well-being index using the Exploratory Factor analysis (Schmid , 2017). This main goal branches to the following sub-branches:

1. To present the concept of subjective Well-being (SWB) and its literature.
2. Study Factorial Structure by using of exploratory factor analysis (EFA) in a way the principal components and the use of the Kaiser rule and scree plot and Criterion Percent Variance extracted and the meaning Criterion to determine the number of factors.
3. Conduct validity and reliability analysis.
4. Determine the relative weight of each factor from factor analysis outputs.

7. Contribution

1. Theoretical side Appears in:

a. Study of exploratory factor analysis, extraction method factors, and criteria for determining the number of factors and their weights, and strategies for rotation Promax.

2. Practical Side Appears in:

a. Application of the test on a sample of 1500 women aged between 15-49 years, from Giza Governorate. the sample was distributed equally in three areas (Agouza represents an urban area, Manwatt represents a rural area, Abu Qatada represents a Slum area).

b. The application of exploratory factor analysis and according to four criteria for determining the number of factors and their weights and strategies for rotation.

c. Determine the relative weight of each factor from factor analysis outputs (explained variance matrix).

8. Defining the Research Idioms

- Factorial structure: The set of default factors latent behind a set of item test or scales or variables in general, and is considered a form of sincerity building is reached through factor analysis.

- Factor analysis: it is A method mathematical represents a large number of mathematical operations and treatments in the analysis of correlations between variables and then interpret these correlations and reduced to a smaller number of variables.

- Exploratory factor analysis: it is, in essence, is inductive and aims to discover the optimal set that can include latent variables and without consideration prior to the formulation of hypotheses.

9. Data Collection & Analysis Method

The data used are from a study entitled “Monitoring demographic, economic and health indicators in Giza Governorate” Data was conduct by the Institute of Statistical Studies and Research in collaboration with the National Population Council. The Survey was carried out in 2016. The collected data are about many key Domains (pillars) for life, for example, education; work; health; family formation; and civic and political participation and others.

In figure (1), a theoretical framework of human well-being, contain subjective well-being (SWB) component by OECD, (OECD, 2013) It is essential to evaluate the validity of the subjective well-being (SWB) by the following:

1. Factor: Exploratory factor analysis indicates that items converge and discriminate data according to evaluated constructs.

2. Reliability: High internal consistency (Cronbach's alpha α) among items in each dimension (Mohsen & Reg , 2011).

9.1. Cronbach's alpha basic equation for alpha¹

$$\alpha = \frac{N}{N - 1} \left[1 - \frac{\sum V_i}{V_{test}} \right] \tag{1}$$

N = number of equations

V_i = variance of scores on each question

V_{test} = total variance of overall score on the entire data

10. Results and Discussion

10.1. Exploratory Factor Analysis (EFA):

The 54 indicators of deprivations are tested with the explanatory factor analysis using principal component extraction method, and Promax rotation method 2, Value of Cronbach's alpha is 0.915, which indicates a high level of internal consistency for our scale with this specific sample shown in table (1).

Table (1): Reliability Statistics

Cronbach's Alpha	N of Items	Valid Cases
0.915	101	1500

Table (2): KMO and Bartlett's Test of Sphericity

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.892
Bartlett's Test of Sphericity	Approx. Chi-Square	71592.236
	df.	1431
	Sig.	0.000

Table (3): Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	19.600	36.296	36.296	19.600	36.296	36.296	18.723
2	4.244	7.860	44.155	4.244	7.860	44.155	4.224
3	3.714	6.878	51.033	3.714	6.878	51.033	5.533
4	2.098	3.885	54.918	2.098	3.885	54.918	6.377
5	1.897	3.512	58.430	1.897	3.512	58.430	8.187
6	1.844	3.415	61.846	1.844	3.415	61.846	5.787
7	1.414	2.619	64.465	1.414	2.619	64.465	4.873
8	1.319	2.442	66.907	1.319	2.442	66.907	4.901
9	1.080	1.999	68.906	1.080	1.999	68.906	1.728
Extraction Method: Principal Component Analysis.							
When components are correlated, sums of squared loadings cannot be added to obtain a total variance.							

¹ Development of Health Measurement scales part II, Dr.Rizwan SA, M.D, center for community medicine all India institute of medical science, New Delhi, India

² using the Promax with Kaiser Normalization.Component Scores rotation method gives the same results as the varimax method as indicated in the appendix

Table (2) indicates the valid use of the explanatory factor analysis with the investigated 54 indicators since the KMO measure of sampling adequacy =0.892 validating the adequate use of factor analysis with the sampling size. In addition, Bartlett test was highly significant at 95% confidence level.

Table (3) presents the factor analysis resulted in nine factors explaining 69% of the variance, which is a good ratio. We have reached nine factors because the Eigenvalue is greater than one, and the percentages of interpretation of variances from the total variance of each factor have been reached. The first major factor has the Eigenvalue 19.6 of the total variances and 36.29%.

Figure (2) represents the Eigenvalue of each factor on the Y-axis of the index and the component number on the X-axis. The diagram is another criterion that can be used in addition to the criterion of retaining the factors that increase their Eigenvalue from the one to determine the factors in the Factor analysis and to retain only those that are in the area is very steep.

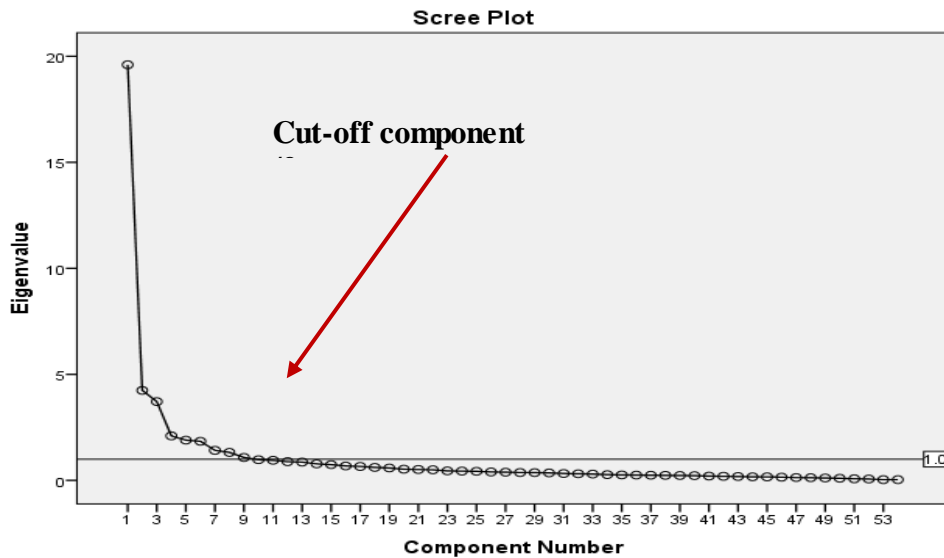


Table 4: Component Correlation Matrix

Component	1	2	3	4	5	6	7	8	9
1	1.000	-0.104	-0.226	0.403	0.497	0.395	0.314	0.418	0.091
2	-0.104	1.000	-0.226	0.214	-0.053	-0.192	-0.008	0.132	-0.071
3	-0.226	-0.226	1.000	-0.240	-0.233	-0.035	-0.335	-0.325	-0.231
4	0.403	0.214	-0.240	1.000	0.255	0.190	0.081	0.044	-0.240
5	0.497	-0.053	-0.233	0.255	1.000	0.334	0.180	0.274	0.105
6	0.395	-0.192	-0.035	0.190	0.334	1.000	0.085	-0.028	-0.151
7	0.314	-0.008	-0.335	0.081	0.180	0.085	1.000	0.259	0.170
8	0.418	0.132	-0.325	0.044	0.274	-0.028	0.259	1.000	0.388
9	0.091	-0.071	-0.231	-0.240	0.105	-0.151	0.170	0.388	1.000

Extraction Method: Principal Component Analysis.
Rotation Method: Promax with Kaiser Normalization.

Table (4) indicates the Component Correlation Matrix between the explained 9 factors.

10.2. Weights Process:

$$\begin{aligned} \text{Total Explained variance to First Factor} &= \frac{\text{Eigenvalue}}{\sum \text{All Eigenvalue}} \times 100 \\ &= \frac{19.6}{54.002} \times 100 = 36.29\% \end{aligned} \quad (2)$$

Weights Calculations from Total Explained variance table (3) as follows;

$$\begin{aligned} \text{First Factor Weight} &= \frac{\text{Variance}}{\sum \text{All Variances}} \times 100 = \\ &= \frac{36.29495}{68.90486} \times 100 = 0.5267 \end{aligned} \quad (3)$$

$$\begin{aligned} \text{Second Factor Weight} &= \frac{\text{Variance}}{\sum \text{All Variances}} \times 100 \\ &= \frac{7.858968}{68.90486} \times 100 = 0.1140 \end{aligned} \quad (4)$$

The other Factors weights are respectively (0.0998, 0.0564, 0.0510, 0.0496, 0.0380, 0.0354, and 0.0290)

11. Conclusions

In this paper, the concept of Subjective Well-being (SWB) has been closely identified as a theoretical input and then applied to raw data collected by a questionnaire prepared for this purpose. The analysis of Reliability was conducted by Cronbach's Alpha and also ensured the integrity of the Factorial Composition through conducting the Exploratory Factor analysis (EFA), the relative weights of each of the nine factors resulting from the EFA were calculated. This paper recommends attention to the collection of data related to the subjective well-being and the supply of international institutions to form a clear picture of the developmental status in Egypt.

12. Recommendations

1. Taking into account the relative weights of the sub-indicators when constructing any composite indices, and not relying on equal weights except in the narrowest limits.
2. Conducting more studies that highlight the subjective well-being component its a part in Composite indices.
3. Collecting data at the national level to build multiple Composite indices, including the Subjective - component in their construction.

4. To provide data to international institutions to ensure accurate results in international reports issued by Egypt.

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