The Structure and Stability of Subjective Well-Being: a Structure Equation Modelling Analysis

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Abstract The purpose of the study is to test the structure and the stability of Subjective Well-Being (SWB), measured through cognitive and affective self-report measures, in global and specific levels of analysis. A sample of 303 adult students was collected and replicated in a 2 month interval. The best model of SWB shows an intercorrelated four-factor structure—Satisfaction with Life, Negative Affect, Positive Affect and Global Subjective Well-being. Results suggest that Global Happiness and Global Satisfaction are measuring the same aspect of SWB. All measures of SWB, in study, show good construct validity and reliability in a 2 month replication. Positive and Negative Affect are significantly weakly correlated. Positive Affect is the most stable variable of SWB, in a short-term interval. Researchers must be aware of the issues related to the measurement of SWB as the order of the items in a questionnaire and the implications of using global or specific measures, cognitive or affective dimensions of the concept, that represent different aspects of the concept. Further study is needed to analyse the structure of SWB with different measures and the relationship between its components.

Keywords Subjective well-being structure · Stability · Satisfaction with life · Positive affect · Negative affect · Structure equation modelling

The Structure and Stability of Subjective Well-Being: Happiness, Satisfaction with Life, Positive Affect and Negative Affect

Subjective well-being has been classified as a diffuse concept and despite the recent systematic study, several authors alert for the need of integration and delimitation of

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the concept as one of the major objectives of study (Diener 2000; Sirgy 2002) and the importance of analysing the implications of using several measures to access the global concept (Diener 2000). The article aims to analyse the structure of SWB using five measures commonly used to measure the concept. We intend to test several definitions of the concept: if there is a separated cognitive and affective dimension of the concept; or three separated components; or a unifactorial structure. The study also addresses the stability of the structure and of the measures of SWB in a short-term interval.

The Subjective Well-Being (SWB) concept, as we know it today, was born in 1960, represented in the hypothesis of the thesis of Wilson (Diener et al. 1999). The concept relates to the subjective appreciation of life by the individual, an internal experience, apart from external criteria.

However, SWB was not always defined as we know it today, it went through conceptual redefinitions. It was initially related to welfare, with a narrower sense, limited to economic indicators (Veenhoven 1996). During the 60s, a change for post-materialistic values proclaimed that there is more to Human Well-being than welfare. The concept acquired a broader sense, beyond the material aspect, including other domains of life, like health, satisfaction with work, with relationships, etc (Van Praag and Fritjers 1999). The National Inquiries started to include questions about Global Happiness and Global Satisfaction (Andrews and Robinson 1991).

In the 70s and 80s there was a *boom* in the research of SWB variables, such as Quality of Life, Happiness, Satisfaction, Positive Affect, etc (Andrews and Robinson 1991; Diener 1984; Lucas et al. 1996; Michalos 1986). Several domains of research in Psychology (and outside Psychology, like Economy and Sociology) have used the concept yet not always with the due respect for its conceptual definitions. As such, SWB became a diffuse and controversial concept that could represent a variety of different phenomena. There was the need for some conceptual redefinition and, for example, in the 80s, the concept of Well-being was divided in Psychological Well-Being, representing six psychological positive dimensions (self-acceptance, positive relations with others, autonomy, environmental mastery, purpose in life, and personal growth) and SWB, representing a subjective cognitive and affective experience of life (Novo 2003; Ryff and Keyes 1995).

Several researchers claimed for the need of a rigorous manipulation of the concept and the respect for its conceptual distinctions (Andrews and Robinson 1991; Campbell et al. 1976; George 1981; Horley 1984). Some others appealed for the need to integrate and delimitate the concept (Diener 1984; Sirgy 2002). Currently, the concept is studied systematically and one of its major objectives has been to establish the limits of its definition (Diener 2000).

Definition of SWB

The systematic measuring of the concept has gathered psychometric validity and reliability and some consensus about its definition. SWB is defined as a multifaceted concept including a cognitive and an affective dimension—conceptualised as Satisfaction with Life and Happiness (Andrews and Robinson 1991; Sagiv and Schwartz 2000; Veenhoven 1991b)—separated but correlated dimensions (Diener and Fujita 1995; Diener et al. 1999).

The concept has also been defined through three basic components: Satisfaction with Life; Positive Affect; and Negative Affect (Lucas et al. 1996; McCullough et al. 2000; Veenhoven 1991b). Sirgy (2002) described the three components as: (1) the experience of Positive Affect in important domains of life; (2) the experience of Negative Affect in important domains of life; and (3) the evaluation of Satisfaction with life as a whole or in several domains. Arthaud-Day et al. (2005) through structure equation modelling tested several models of SWB. The three factor model (cognition, positive affect and negative affect) demonstrated to be the best model to fit the data.

Diener et al. (1997) have also identified three major basic components of SWB: Satisfaction with Life, Positive Affect and low levels of Negative Affect. However, each of the components can be accessed through several levels of analysis: Global Satisfaction with Life may be divided in several domains and these can be divided in several aspects; Positive Affect can be divided in emotions like joy and pride; and Negative Affect can be divided in emotions like, sadness and guilt. In a broader perspective the authors include, in the Negative Affect dimension of the definition of SWB, the mood variables like Anxiety and Depression. SWB can be defined as the way people evaluate their lives and it may include variables such as Satisfaction with Life, marital satisfaction, absence of Anxiety and Depression and the presence of positive emotions.

According to a more consensual definition of SWB we can say it is a multidimensional construct, composed by three basic components—Satisfaction with Life, Positive Affect and Negative Affect—accessed in global and specific levels (Table 1).

Relationship Between the Components of SWB

A person's evaluation about her own life can assume the shape of cognition, when the person produces rational judgements of evaluation about her life as a whole or in specific aspects, and can assume the shape of affect, when the person expresses positive or negative feelings about her life. The cognitive and affective dimensions of SWB demonstrate to be correlated (Diener 2000; Diener and Biswas-Diener 2000). The variable of Satisfaction with Life is considered to represent the cognitive dimension of SWB because it relates to the evaluation of life's realizations according to a particular standard. The Happiness variable represents the affective dimension of SWB. It is considered affective because people report their emotional state without

Table 1 Representation of the subjective well-being structure

	Dimensions	Constructs	Variables/Measures
Subjective well-being	Cognitive	Satisfaction with life	Global satisfaction with life
			Satisfaction with life domains
	Affective	Positive affect	Global happiness
			Specific positive emotions
		Negative affect	Specific negative emotions

determining the causes of their feelings (Sirgy 2002). Satisfaction with Life reflects the cognitive experience of evaluating SWB while Happiness reflects the hedonic aspect of SWB (Veenhoven 1991a).

Emotion and cognition may occur independently of one another, some emotions may be expressed involuntarily without a respective cognitive process. However, the recognition of emotion implies some form of self-perception or cognition and in that case they interact (Zajonc et al. 1982). Some studies reflect a moderate correlation between the cognitive (Satisfaction with Life) and the affective (Happiness) dimensions of SWB (Diener et al. 1995; Kozma 1996; Sandvik et al. 1993). Other studies, however, find no correlation or only a weak correlation between the components of SWB (Balatsky and Diener 1993). Previously, Campbell (1981) has noted that there are no doubts that Satisfaction with Life and Happiness have something in common, but they also differ. Other studies found moderate correlations between Satisfaction with Life and Positive and Negative Affect (Arthaud-Day et al. 2005; McCullough et al. 2000) but the relationship between the dimensions of Affect was not significantly correlated (McCullough et al. 2000).

Relationship Between Positive and Negative Affect

There is a broad scientific debate about the relationship between Positive and Negative Affect. Although the majority of the studies have found an independent relationship between the dimensions of Affect (Billings et al. 2000; Crocker 1997; Goldstein and Strube 1994; Kercher 1992; MacLeod et al. 1994; Potter et al. 2000; Smith and Christensen 1996; Watson and Clark 1994), some have found significant correlations (Benin et al. 1988; Green and Salovey 1999; Russell and Carroll 1999; Watson et al. 1988).

According to Diener (2000) and Fredrickson (1998, 2001), however, scientific research should measure Positive and Negative Affect separately because they are separated constructs, each correlating to different variables and allowing to withdraw different conclusions. In this study, we followed the advice of the authors and used the Positive and Negative Affect scales separately, we also intended to analyse the relationship between the dimensions of Affect.

Levels of Analysis of SWB—Global and Specific

The cognitive and the affective dimensions of SWB can be accessed in several ways and no one has proved to be more efficient than the others. The utility of SWB measures depends on their own adequacy in relation to the purposes of the study (Pais-Ribeiro 2004). Some authors classified the levels of analysis of SWB in global or specific measures (Andrews and Robinson 1991), also known as reflexive or formative measures (Sirgy 2002). Global level of analysis of SWB is a holistic approach, a direct evaluation through one-item measures. This level of measure constitutes a reflexive indicator and shows higher stability through time. The specific level of analysis of SWB is a focused and narrower approach, an indirect evaluation through several components. This level of measure constitutes a formative indicator, showing to be more sensitive to causal variables and allowing understanding the specific conditions that predict SWB (Table 2).

Table 2 Dimensions and levels of analysis of SWB

	Cognitive	Affective
Global/Reflexive	Global satisfaction with life	Global happiness
Specific/Formative	Satisfaction with life domains	Positive affect
		Negative affect

The cognitive dimension of SWB can be accessed in a global level through one-item measures of Satisfaction with Life, past, present or future (Schwarz and Strack 1999) or in a specific level, through Satisfaction with Life in Domains. Usually, this construct is accessed through several items as, for example, satisfaction with work, with health, with income (Diener et al. 1999) that can be summed in a total score and may include the importance attributed to each domain. The life domains considered to be more important contribute more significantly than the less important domains to the total Satisfaction of the individuals (Sirgy 2002). Schwarz and Strack (1999) suggested that it would be probable that people answered in a simpler way, based on their feelings, when they were asked a global Satisfaction question rather than when they were asked a specific domain question. In the present study we integrated global and specific cognitive components of SWB—one Global Satisfaction item and a Satisfaction with Life in specific domains scale.

The affective dimension of SWB can also be accessed in a Global or in a Specific level of analysis through one-item measure as Global Happiness or through measures of specific emotions. The global measure is a trait like measure and the least influenced by contextual variations (Andrews and Robinson 1991). Specific measures of Affect can assume several shapes, including graphic measures and checklists of emotions. The checklists of Affect can offer a balanced result, subtracting the score of Negative Affect from the score of Positive Affect (Stone 1997).

According to Diener and Biswas-Diener (2000), using simultaneously global and specific levels of self-report measures of SWB can strengthen the concept of SWB and deepen the understanding of the processes of SWB. Each type of measure implies different answering processes and there is a lack of studies that use simultaneously several levels of measures of SWB. As Diener (2000) advises, several measures of SWB should be studied together in order to observe and establish their relationships and contribute to the definition of SWB. The relevance of this study is related to the analysis of the concept of SWB and its stability and with the simultaneous use of several cognitive and affective, global and specific measures of SWB.

Stability of SWB Measures

Generally, the studies seem to agree with a moderate stability in the SWB measures. For most of the time, for the majority of people, SWB is relatively stable (Costa and McCrae 1988; Costa et al. 1987; Diener et al. 1993; Headey and Wearing 1991, 1992; Magnus and Diener 1991). However the interpretation of moderate stability is different according to the authors.

Several researchers have interpreted that the moderate stability of SWB is determined by stable personality factors (Costa and McCrae 1988; Costa et al. 1987; DeNeve and Cooper 1998). Costa et al. (1987) compared people who lived in relatively stable conditions of life and others that experienced major changes like divorce and widowhood. The group that experienced major changes in life showed only a minor difference in the variability of SWB in relation to the other group. Likewise, Diener et al. (1993) found that people revealed similar levels of SWB through a 10 year period, independently of changes in their income. Other researchers interpret the moderate stability of the measures of SWB as revealing sensitivity to changes in life's circumstances (Eid and Diener 1999; Headey and Wearing 1992; Magnus et al. 1993). According to Headey and Wearing (1989), for SWB to be mainly determined by trait variables it would have to show high stability through time as found by Costa (1994) in personality variables, through a period of 30 years. Still, other researchers have interpreted these results as self-regulation mechanisms, a way of keeping SWB in accepted levels and consequently a balanced emotional state. Cummins (1998) observed a tendency for people to maintain SWB in positive levels above the medium level, not exceeding the maximum level of 80% nor declining under a minimum level of (70%).

Not all studies find moderate stability of SWB variables, some found high levels of stability in Life Satisfaction (Diener et al. 2006; Eid and Diener 2004), while others found moderate stability (.45) in a 1 year interval, diminishing annually until weak stability (.29) in a 10 year interval (Ehrhardt et al. 2000). According to the authors, results contradict the belief that Satisfaction with Life is mainly influenced by trait factors. On the other hand, the emotional components of positive and negative affect are found to be less stable and more reactive to situational influences (Chow et al. 2005).

Feist et al. (1995) concluded that SWB can be considered a state or a trait variable because there is stability and change in SWB. Most probably, there are predisposition factors as well as contextual factors determining the SWB of individuals. We believe, that some of the diverging results in the stability of the SWB measures may also be explained by differences in the measuring processes.

Issues in the Measurement of SWB

Experimental literature identifies a group of sources of information that individuals use when evaluating SWB: the affective state at the moment of the report; future expectations, past events and social comparisons. If individuals are asked to report their Global Satisfaction or Global Happiness, they probably will base their evaluation in their present affective state because it will be easier to evaluate. If the value of information supplied by the emotional state is for some reason discredited or not relevant, other sources of information might be used, like the comparison strategy. Probably, this is also the strategy used in the Satisfaction with Life in Domains (Schwarz and Strack 1999).

Global measures, as Schwarz and Strack (1999) noticed, reveal lack of validity. This kind of measures are subjected to several transitory influences as, for example, memory, situational factors, the format of the questionnaire, the answering options,

the standards of comparison, lack of temporal stability and social desirability. Schwarz and Strack (1999) noticed for example that when the questionnaires use Global Satisfaction and Global Happiness they may suggest an apparent redundancy, especially if the items appear in different questionnaires applied by different researchers. In that case, individuals tend to consider that these are the same question and the correlations show that there is no difference between them. If the items appear in the same questionnaire the individuals tend to differentiate them and the correlations are significantly lower.

The single item measures of SWB received criticism because they revealed less psychometric qualities than the multiple item scales (Diener 2000; Schwarz and Strack 1999). Recent studies prove the validity and reliability of the measures of self-report of SWB, the multi-item measures demonstrate better psychometric properties than the one-item measures (Diener and Biswas-Diener 2000). On the other hand, some authors defend they show an adequate reliability and validity (Pavot and Diener 1993). Most of the initial measures of SWB were single items that questioned about Satisfaction and Happiness, with several answering options (Andrews and Robinson 1991). There are few multiple-item measures of SWB that access both the cognitive and the affective dimension of the concept (Diener 2000). We use single item measures in this study in order to test a cognitive and an affective nature of the measures, in order to analyse the different answering processes in global and specific measures of SWB and we also aim to test the psychometric qualities of the global items. As suggested above by Diener and Biswas-Diener (2000), using simultaneously global and specific levels of self-report measures of SWB can strengthen the concept of SWB and deepen the understanding of the processes of SWB.

Another aspect of SWB measurement relates to the accessibility of the information used in the judgement of SWB. When people use a comparison strategy to judge their own SWB, if the information used was temporarily accessed (i.e., supplied occasionally by the questionnaire or through the research setting), instead of chronically accessed information (i.e., usually relevant to the individuals), the report of SWB will be less stable through time. If the report reflects chronically accessed information, it will be more stable through time. The effect of the order of the items in a questionnaire presupposes that the previous questions produce temporarily accessible information that in any other case would not be accessible. The same question may have different answers depending on the order in which it appears in a questionnaire in relation to the others (Schwarz and Strack 1999). This is an important fact to consider when we place SWB measures in a global questionnaire.

Overview and Hypotheses

The purpose of the study is to analyse the structure of SWB according to the definitions of the concept and contribute with data to a stronger delimitation and integration of the concept. We will test the following hypotheses according to the previous literature: a) The best model defines SWB as including four intercorrelated components, namely, Satisfaction with Life in Domains; Positive Affect; Negative Affect and Global Subjective Well-Being (Global Satisfaction with Life and Global

Happiness); b) The SWB structure is stable, in a 2 month-interval[1]; c) The measures of SWB show reliability, in a 2-month interval; and, d) Specific measures of SWB show higher stability than the global measures of SWB, in a 2-month interval;

Method

Participants

We applied the questionnaires to 303 Portuguese adults, professional trainees (39.2%) and university students (60.8%) and repeated the application in a 2-month interval. In time II, 245 questionnaires were collected. Although this was a convenience sample, we intended it would be as diversified as possible in terms of socio-demographic characteristics. The participants are aged between 20 and 58 years old, 81.1% are young adults (20 to 40 years old) and 67% are women. In terms of years of education, 25.5% of the participants completed 4 to 9 years of education, 22.5% completed 10 to 12 years and 42.2% completed 13 to 17 years. In terms of marital status, 45.8% of the participants are single, 43.8% are married or live with a partner and 10.4% are divorced or widowed. In terms of employment status, 45.7% of the participants are employed, 34.1% are unemployed and 18.8% are full-time students. In terms of family income, 45.1% of the participants earn between 365.6 and 1096.8 euros per month, situated in a medium socio-economic status. The participants of the study volunteered, were not paid and were informed of the confidentiality and anonymity of their answers, in accordance to the ethical standards of the American Psychological Association (APA).

Materials

1. *Global Happiness*, measured with a one-item measure intended to access the affective global dimension of SWB. We selected the item used by the Gallup Organization of the American Institute for Public Opinion—"In general, how happy would you say you are?" We opted for a seven point scale in order to discriminate minor differences in the levels of Global Happiness: (1) "Extremely Unhappy"; (2) "Very Unhappy"; (3) "Unhappy"; (4) "Not Unhappy nor Happy"; (5) "Happy"; (6) "Very Happy"; (7) "Extremely Happy" (Andrews and Robinson 1991). As a global measure of SWB, a wide (in general) time of reference was used. In the present study yielded a moderate stability ($r(247)=.46$, $p<0.001$) in a 2-month interval replication.
2. *Global Satisfaction,* measured with a one-item measure intended to access the cognitive global dimension of SWB. We selected the item used in the Eurobarometer: "On the whole, how satisfied are you with your life?" We opted for a seven point scale in order to discriminate minor differences in the levels of Global Satisfaction, from: (1) "Extremely Unsatisfied"; (2) "Very Unsatisfied"; (3) "Unsatisfied"; (4) "Not Unsatisfied nor Satisfied"; (5) "Satisfied"; (6) "Very Satisfied"; (7) "Extremely Happy" (Andrews and

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[1] The stability of SWB is usually measured in six months or wider intervals, in this study we intended to analyse its stability in a narrower interval.

Robinson 1991). As a global measure of SWB, a wide (on the whole) time of reference was used. In the present study, Global Satisfaction yielded a moderate stability ($r(239)=.47$, $p<0.001$) in a 2-month interval replication.

3. *Satisfaction with Life in Domains*, measured by the Quality of Life Index (Ferrans and Powers 1985). It is a specific multi-item cognitive measure of SWB that measures the satisfaction and importance of 31 life domains, in the present, in a six point scale: (1) "Very Dissatisfied"; (2) "Moderately Dissatisfied"; (3) "Slightly Dissatisfied"; (4) "Slightly Satisfied"; (5) "Moderately Satisfied"; (6) "Very Satisfied"; (1) "Very Unimportant"; (2) "Moderately Unimportant"; (3) "Slightly Unimportant"; (4) "Slightly Important"; (5) "Moderately Important"; (6) "Very Important". As a specific measure of SWB, a narrow (at present) reference time was used. Results reflect the overall quality of life, considering the satisfaction and the importance attributed to each life domain and four subscales: health and functioning; family; social and economic; psychological and spiritual. We used the Portuguese translation from Pais-Ribeiro of the general population questionnaire version. Two Portuguese psychologists translated the original version to the Portuguese language and a native Portuguese, resident in England for 12 years, back translated the questionnaire from the Portuguese to the English language. After comparing the translations' version some changes were introduced. Studies supported the psychometric qualities of the scale: the construct validity (Ferrans and Powers 1992); the convergence validity with the Life Satisfaction from Campbell, et al. (1976) (Anderson and Ferrans 1997; Bliley and Ferrans 1993); and with Cronbach's alpha between .89 and .95 (Canaval et al. 2000). In our study, the internal consistency of the scale was .91 (time I) and .93 (time II). The test–retest correlation in a 2-month interval was moderated (.64). Good convergent and discriminant validity in time I, but some minor secondary loading in time II, were found. In our study, through principal components' analysis the items did not converge in the four subscales as the original scale (health and functioning; social and economic; family; psychological and spiritual), for that reason we used exclusively the global indicator of quality of life. The measure shows a moderate stability (.64) in a 2-month interval replication.

4. *Positive and Negative State Affect*, measured by the Positive and Negative Affect Schedule (PANAS) (Watson et al. 1988, Portuguese version from Galinha and Pais-Ribeiro 2005). We used a specific multi-item Positive and Negative State Affect instrument that measures how does the individual feel, at present, considering ten positive and ten negative specific emotions in a five point scale, from: (1) "Very slightly or not at all" to (5) "Extremely". As a specific measure of SWB, a narrow (at present) reference time was used. PANAS is one of the most widely used Affect scales and was validated in several countries, showing high stability and internal consistency (Watson et al. 1988). The Portuguese validation revealed an internal consistency (*Cronbach's alpha*) $\alpha=.86$ for the Positive Affect and $\alpha=.89$ for the Negative Affect scales and showed an independent relationship between the two scales ($r=-.10$). In the present study, the relationship between the positive and the negative Affect was independent ($r=.04$), in time I, but revealed a very weak association ($r=-.18$), in time II. The authors of the scale have predicted this possibility because their studies also revealed very weak negative associations between the scales, from $r=-.12$ to

$r=-.20$ (Watson et al. 1988). In our study the scale shows good internal consistency with a Cronbach's alpha of .87 and .88 for the ten items of Negative state Affect (time I and time II) and a moderate stability (.52) in a 2-month replication. Cronbach's alpha for the ten items Positive state Affect was .82 and .89 (time I and time II) and a moderate stability (.64).

Procedure

After obtaining the institutions, the teachers and the trainers' permission, we approached the students in the classroom, at the end of the lessons. We invited the students to participate in a "quality of life" study. Quality of life is a more widely used term in Portugal, unlike SWB which is a more scientific term. All questionnaires were answered in the presence of the researchers. We requested the students to write their names and the number of the questionnaire in a separated sheet. In time II of data collection, 2 months later, the students answered the questionnaires with the same number. The questionnaires were identical in both trials. The researcher supplied an e-mail address to the participants in order to answer any questions about the research. Time II of data collection occurred during the months of June and July, during the final term evaluations. Several participants have verbally manifested that they were experiencing stress related to the exams that would probably affect the answering to the questionnaire.

Preliminary Analysis

The correlation matrix of the database resulted in a 234 sample in both times of data collection. The measurement models of the instruments were analysed in both trials and the best four item loadings for each construct were selected. The best four items of the Satisfaction with Life in Domains in both data collection were, satisfaction: *with life as a whole* (.84; .83); *with yourself* (.72; .78); *with the success in your life* (.72; .76); *with your peace of mind* (.72; .71). The best four items selected to measure Satisfaction with Life in Domains all belong to the psychological and spiritual subscale of the instrument. This means that the other subscales (health and functioning; family; social and economic) are not represented in the construct. The best four items of the Positive State Affect Scale, in both data samples, were: *enthusiastic* (entusiasmado) (.81, .81); *inspired* (inspirado) (.70, .80); *delighted* (encantado) (.68, .78); *determined* (determinado) (.66, .66). The four best items of the Negative State Affect Scale were: *scared* (assustado) (.84, .72); *afraid* (amedrontado) (.84, .75); *upset* (atormentado) (.79, .72); *distressed* (perturbado) (.71, .71). All factor loadings indicate very good construct validity for the measures in study.

Results

Analysis of SWB Structure

We were looking for the best model for the structure of SWB to describe the data collected with five measures of SWB, namely, Satisfaction with Life in Domains,

Positive Affect, Negative Affect, Global Satisfaction with Life and Global Happiness. The measures represent a cognitive dimension, an affective dimension, specific and global levels of measurement of SWB (Table 2).

According to our hypothesis, the factorial model that best describes the data it is composed of four intercorrelated components: Satisfaction with Life in Domains; Positive Affect; Negative Affect; and Global Subjective Well-Being (Global Happiness and Global Satisfaction) (Fig. 1).

Results show a χ^2 of 105.5, df=71, p=.005, significantly different from the data, but with very good *ad hoc* goodness-of-fit indices (*CFI*=.98; *NFI*=.93; *RMSEA*=.05), suggesting it fits the data fairly well.

We tested an alternative model (b) where SWB represents a higher order construct, composed by a second order cognitive dimension (including the Global Satisfaction with Life and Satisfaction with Life in Domains) and a second order affective dimension (including Global Happiness, Positive Affect and Negative Affect) (Fig. 2).

Since it was a hierarquical model with a third order factor, in order to achieve the identification of the model, several parameters were constrained: a) the variance of the third order latent variable to one; b) the variance of the residuals of the second order latent variables to zero; and c) the variance of the error of the one-item measures observed variables (Global Happiness; Global Satisfaction) to zero. Results yielded a χ^2=132,7, df=74, p<.001. Some ah doc goodness-of-fit indices indicate reasonable fit (*CFI*=.96; *NFI*=.91; *RMSEA*=.06), however, the hypothesised model is significantly better (Table 3).

We also tested a second alternative model (c), also theoretically plausible, but more parsimonious. Defining SWB as a higher order factor that explained
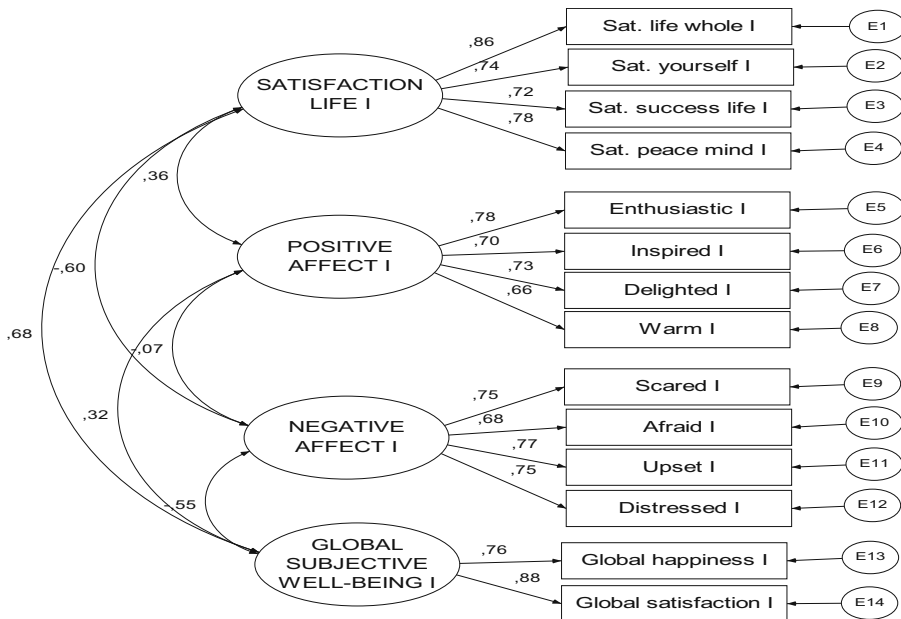

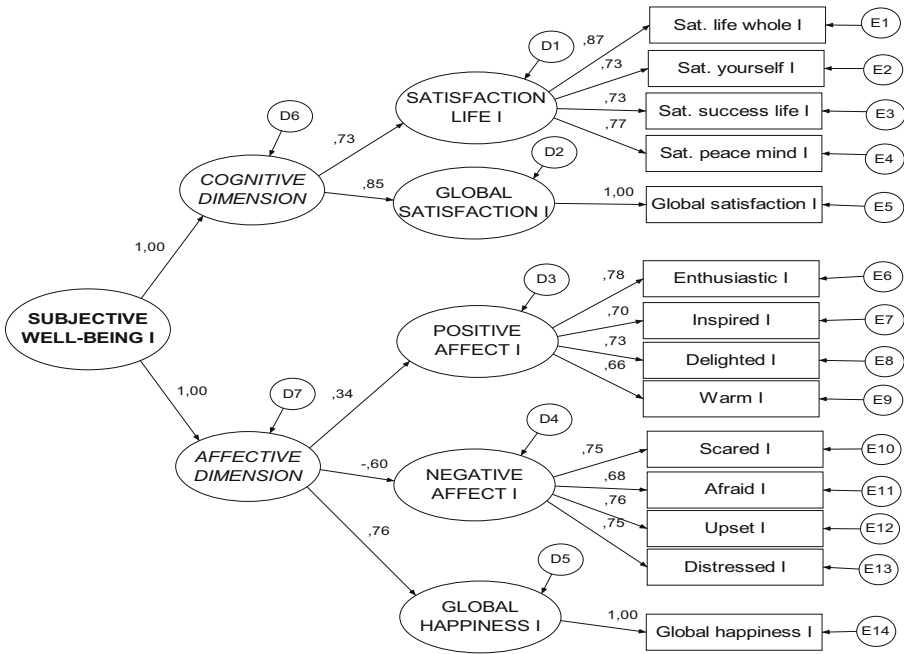Fig. 1 Hypothesized model of the structure of SWB

Fig. 2 Alternative model (b) of the structure of SWB

Satisfaction with Life in Domains, Positive Affect and the Negative Affect as latent variables, along with a fourth latent variable that we called Global Subjective Well-Being, and included Global Satisfaction and Global Happiness items, as observed variables.

The alternative model (c) shows a $\chi^2=116.2$, $df=73$, $p<.001$, and better goodness-fit indices ($CFI=.97$; $NFI=.92$; $RMSEA=.05$) (Fig. 3). The model (b) is significantly better than the first alternative model (b) but significantly worst than the hypothesised model (Table 3).

The best model of SWB does not separate a cognitive from an affective dimension of SWB, nor does it separate Global Happiness and Global Satisfaction with Life as representing, respectively, affective and cognitive measures of SWB. On the contrary, according to the best model, the one-item global measures explain the same factor, suggesting they are measuring the same aspect of the SWB construct. We designated it the global dimension of SWB.

Table 3 Comparison of the goodness-of-fit results for the hypothesised and the alternative SWB models

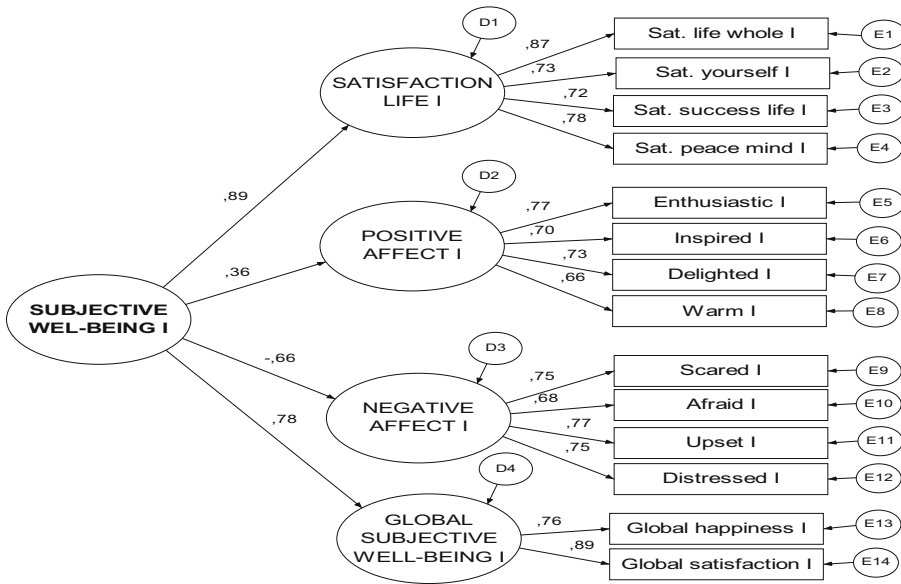| Models	χ^2	df	CFI	NFI	RMSEA	$\Delta\chi^2$	Δdf
Hypothesised	105.5**	71	.98	.93	.05	–	–
Alternative (a)	132,7***	74	.96	.91	.06	27,2***	3
Alternative (b)	116.2***	73	.97	.92	.05	10.8**	1

*** $p<.001$; ** $p<.01$

Fig. 3 Alternative model (c) of the structure of SWB

Structure of SWB

Analysing closely the four intercorrelated factor model we observe that all of the observed variables load on the latent variables above .65, indicating good construct validity. Analysing the correlations between the factors of SWB, we can observe that the higher correlations is between Satisfaction with Life and Global Subjective Well-Being (.68), followed by the inverse correlation between Satisfaction with Life and Negative Affect (−.60) and between Negative Affect and Global Subjective Well-Being (−.55). With weak correlation[2] weights are the relationships between Satisfaction with Life and Positive Affect (.36) and between Positive Affect and Global Subjective Well-Being (.32). With a very weak significant inversed correlation is Positive and Negative Affect (−.07). In fact, almost all variables of SWB correlated moderately between each other, except for Positive Affect that showed weak correlations with the other variables and a very weak relationship with Negative Affect. The parameter estimates are feasible, with appropriate standards of error and statistical significance.

The best model to describe the data, in time I, is the one that defines SWB as a four-factor structure—Satisfaction with Life in Domains, Positive Affect, Negative Affect and Global Subjective Well-Being (Global Satisfaction/Happiness)—separated but significantly correlated. The construct includes cognitive, positive and negative affective measures, accessed through global and specific levels of measurement.

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[2] The correlations are described as moderate (.40–.69), weak (.39–.21) and very weak (<.20) as suggested by Pestana and Gageiro (2003).

Stability of the Structure of SWB

The second hypothesis of our study is that the structure of SWB is stable in a 2-month interval. To test this hypothesis we designed the hypothesised model in both times of data collection. For that purpose, the errors of the observed variables at time I and the errors of the observed variables at time II were correlated, as well as the latent variables at time I with the same variables at time II (Fig. 4).

Results at a baseline model show a $\chi^2=599.7$, $df=320$, $p<.001$, ($CFI=.92$; $NFI=.85$; $RMSEA=.06$). The correlations between the four factors in time I and the four factors in time II were constrained to equality, in order to test the structure stability between time I and time II of data collection. Results show a $\chi^2=610.9$, $df=326$, $p<.001$. The difference between the models is not significant ($\Delta\chi^2=11.2$, $\Delta df=6$, $p=.08$). We can conclude that the structure of SWB, as described by the model is stable, in a 2-month interval.

The regression weights between the observed variables and the latent variables are generally slightly stronger at time II, above .67, indicating good construct validity. The correlations between the components of SWB are similar between time I and time II, except for the relationship between the Positive and the Negative Affect that is weakly correlated (−.35) in time II.

Stability of SWB Measures

To test the stability of the SWB measures in the model, in a 2-month interval, we tested the invariance of the regression weights in both times of data collection. To obtain the identification of the model, the variances of the latent variables were constrained, as well as, the correlations between the four factors of SWB. Then, the
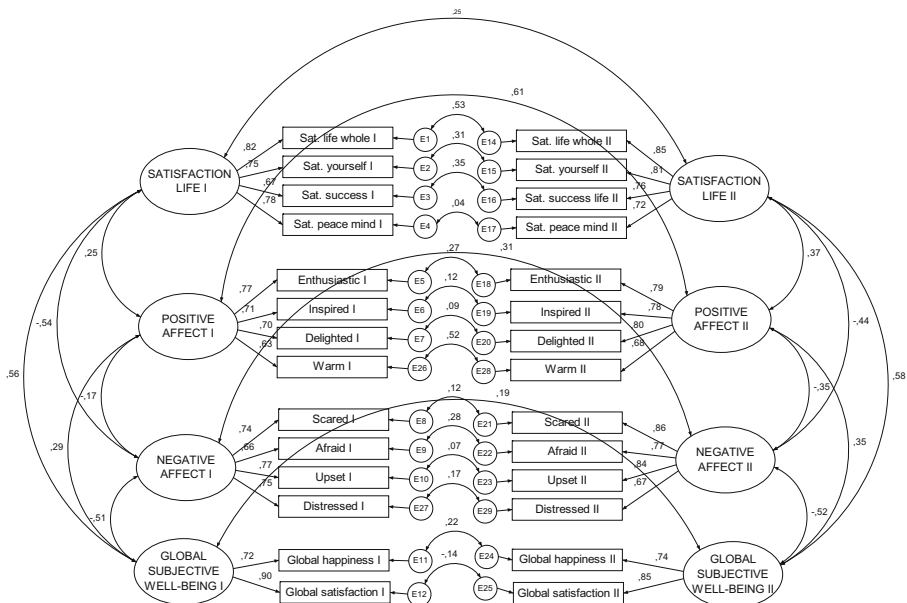

Fig. 4 Model of the structure of SWB in both times of data collection

equality in the regression weights between the observed and the latent variables in time I and time II was constrained. Results at a baseline model shows a $\chi^2=1603.5$; $df=332$, $p<.001$ and at a constrained model shows a $\chi^2=1620.9$; $df=346$, $p<.001$. The difference between the models is not significant ($\Delta\chi^2=17.4$, $\Delta df=14$, $p=.24$), suggesting that the measures show reliability, in a replication of a 2-month interval.

About the correlation between the four factors of SWB in time I and the same factors in time II, results show moderate and weak correlations. The variable with the higher variance temporal stability is the Positive Affect variable, with a .62 correlation, followed by the Negative Affect variable with a .30 correlation, by the Satisfaction with Life in Domains variable with a correlation of .25 and by the Global Subjective Well-Being factor with a correlation of .19. To test the hypothesis (e) that the specific measures of SWB are more stable than the global measures of SWB we have constrained the correlations between the latent variables in time I and the same variables in time II. We have found that the variable that shows the higher temporal stability, in a 2-month interval, is Positive Affect since the correlation is significantly higher than the correlation of Satisfaction with Life Domains ($Z=3.24$; $p<.001$); higher than the correlation of Negative Affect ($Z=3$; $p<.001$) and higher than the correlation of the Global Subjective Well-Being ($Z=3.35$; $p<.001$). The temporal stability between other variables of SWB (Satisfaction with Life in Domains, Negative Affect and Global Subjective Well-Being) was not significantly different.

Discussion

Structure of SWB

SWB has been systematically studied in order to establish the limits of its definition. However, researchers still claim for a rigorous definition of the concept. SWB is considered to have a cognitive and an affective dimension, respectively Satisfaction with Life and Happiness (Andrews and Robinson 1991; Sagiv and Schwartz 2000; Veenhoven 1991b), which are separated but widely correlated dimensions (Diener and Fujita 1995; Diener et al. 1999). It is defined by three basic components, Satisfaction with Life, Positive Affect and Negative Affect (Arthaud-Day et al. 2005; Lucas et al. 1996; McCullough et al. 2000; Sirgy 2002; Veenhoven 1991b). SWB can be accessed through cognitive and affective dimensions, global and specific levels of analysis (Andrews and Robinson 1991; Sirgy 2002). Global Satisfaction can be divided in Satisfaction with several Life Domains. Positive Affect and Negative Affect can be divided in emotions. The three components of SWB can form a global factor or intercorrelated variables (Diener et al. 1997). McCullough et al. (2000) concluded that the correlation between the several indicators of SWB show that they are distinct yet related concepts.

In the present study, we used five measures of SWB to represent the above dimensions and levels of analysis of SWB (Table 2). Several models were tested, according to the definitions of the concept. The hypothesized model defined four separated components, namely, Satisfaction with Life in Domains, Positive Affect, Negative Affect and Global Subjective Well-Being (Global Satisfaction/Happiness). The best model confirms the hypothesis, indicating that the variables in study are

discriminated yet significantly correlated, as if measuring different aspects of a common concept. The construct includes cognitive, positive and negative affective measures, accessed through global and specific levels of measurement. Results also indicate good construct validity of the measures in study.

Relationship Between the Components of SWB

Several studies reflect a moderate correlation between cognitive and affective variables of SWB (Arthaud-Day et al. 2005; Diener et al. 1995; Kozma 1996; McCullough et al. 2000; Sandvik et al. 1993), however, other studies found only weak or no correlations (Balatsky and Diener 1993). Our results show moderate and weak correlations[3] between the several components of SWB, and very weak correlations between Positive and Negative Affect. Positive Affect is the measure of SWB that shows the weakest association with the other SWB variables in the model.

About the Relationship Between Positive and Negative Affect the majority of the studies demonstrated orthogonality between the dimensions of Affect (Billings et al. 2000; Crocker 1997; Goldstein and Strube 1994; Kercher 1992; MacLeod et al. 1994; Potter et al. 2000; Smith and Christensen 1996; Watson and Clark 1994), which is not surprising since the schedule was developed according to the principle of orthogonality (Watson et al. 1988). However, other studies have found an inverse correlation (Benin et al. 1988; Green and Salovey 1999; Russell and Carroll 1999). The explanation for the diverging results comes from the authors of the scale. Although the scale was developed according to the principle of orthogonality, the authors have previously stated that the dimensions of Affect are highly but not absolutely independent. The authors of the scale have also found minor significant correlations between the subscales of Affect (from $r=-.12$ to $r=-.20$) in their studies (Watson et al. 1988). Our results yield weak significant correlations in both times of data collection. We suggest further study in order to identify in what circumstances is the relationship between Positive and Negative Affect orthogonal or inversely correlated.

Cognitive and Affective Dimension of Subjective Well-Being

We tested a model where Global Satisfaction with Life and Satisfaction with Life in domains would represent a cognitive dimension of SWB and where Global Happiness, Positive and Negative Affect would represent an affective dimension of the concept. The model showed reasonable goodness-of-fit indices but it was not the best model to fit the data.

We support the importance of analysing the nature of the measures of SWB chosen in the definition of the concept (Diener 2000). Several measures of SWB should be studied conjointly in order to observe and establish their relationships and contribute to the definition of the concept. It is possible to deepen the understanding

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[3] The correlations are described as high (>.70), moderate (.40 to .69), weak (.21 to .39) and very weak (<.20).

of the phenomenon and to produce different theoretical explanations about the processes of SWB if we understand the specific patterns of results produced by each dimension and level of analysis of SWB. Because each measure of SWB, cognitive or affective, global or specific, has specific implications in the results it is important to always discriminate which type of measures we are using.

Global Happiness and Global Satisfaction one-item measures are two of the most widely and long used measures of SWB. They are considered to represent, respectively, a cognitive and an affective measure of SWB (Andrews and Robinson 1991; Diener 2000; Csikszentmihalyi and Wong 1991; Sirgy 2002). It seems consensual that Satisfaction with Life reflects the cognitive experience of SWB (Andrews and Withey 1976; Lucas et al. 1996), while Happiness reflects the hedonic balance of Positive and Negative Affect (Diener and Emmons 1985) although some authors pointed out that they are not pure cognitive or affective indicators (Andrews and Robinson 1991).

We tested a model where the one-item Global Satisfaction with Life represented a cognitive dimension while Global Happiness represented an affective dimension. The model showed reasonable goodness-of-fit indices but the best model indicates that they are measuring the same aspect of the concept. We designated this factor, a global dimension of SWB. Schwarz and Strack (1999) found similar results and suggested that the reason might be related to the order of appearance of the items in the questionnaires. Global Happiness and Global Satisfaction tend to look similar when they appear in separate questionnaires, applied by different researchers and show lower correlations when they appear in the same questionnaire. In our study, however, the global items appear right next to each other in the beginning of the questionnaire, promoting the differentiation between the items. We conclude that even when the items appear in the same questionnaire they may show similarity. However, the global items measure a different aspect of SWB, explaining part of the phenomenon. We suggest that they may be used interchangeably, or together, as a global dimension of the concept.

Stability of SWB

The best model showed *structure stability* in a 2-month replication. The results also support the psychometric characteristics of the measures in study, showing the *stability of the measures*, in a 2-month interval.

We also tested the *stability of the variance* of the SWB components in a 2-month interval. Previous scientific research shows that SWB is reasonably stable for most people, most of the time (Costa and McCrae 1988; Costa et al. 1987; Diener et al. 1993; Headey and Wearing 1991; 1992; Magnus and Diener 1991). Some authors have defended that the stability of SWB through several years is due to the major influence of the personality on SWB (Costa and McCrae 1988; Costa et al. 1987; DeNeve and Cooper 1998). Other authors have interpreted that the stability of SWB is a reflex of an appropriate sensibility to life's circumstances (Headey and Wearing 1992; Magnus et al. 1993). According to Headey and Wearing (1989) and Ehrhardt et al. (2000) results show that there is stability but also variability in SWB that cannot be attributed exclusively to innate personality factors. SWB may be

conceptualized as a state or a trait variable because there is stability and change in SWB (Feist et al. 1995). The results of this study show moderate and weak temporal stability of the variances of the constructs in a short-time interval, suggesting a considerable influence of transitory factors. In this case, the fact that the students were passing through their final exams' period, in time II of data collection, may explain part of the results. Our results, however, with the measures in study, support the idea that SWB behaves more as a state variable, permeable to contextual influences, than as a trait measure, primarily influenced by predisposition factors.

The higher temporal stable component of SWB, in a 2-month interval, was Positive Affect. The stability was moderate and significantly higher than the other measures of SWB in study, including Negative Affect. The other components of SWB show only weak correlations with the replication, suggesting Positive Affect is less permeable to contextual influences than the other measures of SWB. The result is surprising since we expect state affect scales to be more variable and reactive to situational influences (Chow et al. 2005; Stone 1997). It is interesting to observe the difference between the subscales of Affect, suggesting they are emotions with different natures and functions, previously noted by several authors (Fredrickson 1998, 2001; Lyubomirsky 2001; Lyubomirsky et al. 2005). Could it be that there is a predisposition or an attitudinal aspect in Positive Affect? We suggest further study in order to understand the differences between the Positive and the Negative dimensions of Affect and the relationship they establish.

We expected to find a higher stability in the specific measures of SWB than in the global measures of the construct. Considering Schwarz and Strack (1999), specific measures are less complex and less sensible to emotional fluctuations, supplying the information for the comparison and the criteria for evaluation. For this reason, the judgement domains are more subjected to inter and intra-domain comparisons, while the evaluation of life as a whole can be more subjected to the emotions in the present. Our results do not support Schwarz and Strack's (1999) claim, since it was not observable that Global Satisfaction with Life is significantly less stable than Satisfaction with Life in Domains.

About the Order of the Items in the Questionnaire we used two Global Satisfaction with Life items in different places of the questionnaire, one is the 1st item and the other is the 58th item in the questionnaire. The items intend to measure the same construct and are semantically identical: item 1, "Globally, how Satisfied are you with your Life?"; item 58, "How Satisfied are you with your Life as a whole?" The second Global Satisfaction with Life item appears after the Positive and Negative Affect and the Satisfaction with Life in Domains' scales. We tested a model (b) where both items measured the same construct but a significant better model discriminated them as measuring different things, yet moderately correlated. Although the wording of the items is not exactly the same, the items are semantically identical and intend to measure the same construct. This result corroborates the relevance of the order of appearance of the items in a questionnaire. It also gives understanding about the answering processes to SWB instruments. The results support Schwarz and Strack's (1999) claim that there is an effect of the order of the items in a questionnaire. The information from preceding questions may become accessible when in any other way it would not be. After answering about Satisfaction with several Life Domains, the

answer to the Global Satisfaction item changes. This suggests that based on the information available (*relevant*) in the memory of the individuals the evaluation of Global Subjective Well-Being is different than after reading structured information supplied by the questionnaire.

About the differences in the *answering processes related to global or specific levels of measurement of SWB*. We used two measures of Global Satisfaction with Life, measured with one item and measured with the total sum of several life domains. Both measures intend to measure the same construct but through different answering processes. Results indicate that the measures are not measuring the same, they constitute different factors. We can conclude that despite the fact that the instruments intend to measure the same construct, overall Satisfaction with Life, the answering processes are different, constituting different levels of analysis, and so are the answers. Researchers must be aware of the type of instruments used and their implications in the answering processes of the individuals.

The issues related to the measuring of SWB may explain some of the diverging results in the SWB studies. We agree with Arthaud-Day et al. (2005) that most existing research uses interchangeably cognitive and affective measures of SWB as if it was unidimensional in nature, when in fact it shows to be a multidimensional construct. Different sequences of questions, different types of measures, different dimensions and levels of measurement of the concept produce different answers and different correlates. We suggest further study to clarify the impact of the order of the items and of the types of measurement in the answering processes on SWB. Also, as defended by Diener (2000), it is important that researchers identify what kind of measure of SWB is being used, a cognitive or an affective measure, a global or a specific measure of SWB in order to know what to expect from the results.

The best model of SWB shows an intercorrelated four-factor structure—Satisfaction with Life in Domains, Negative Affect, Positive Affect and Global Subjective Well-being (Global Satisfaction/Happiness). The structure of the concept is stable in a 2-month interval and includes cognitive, positive affective, negative affective and global components, separated but correlated dimensions. Results suggest that Global Happiness and Global Satisfaction are measuring the same aspect of SWB, and do not represent, respectively, an affective and a cognitive measure of SWB. All measures of SWB, in study, show reliability in a 2-month interval. Positive and Negative Affect were significantly weakly correlated. Positive Affect is the most stable variable of SWB, in a short term interval. Researchers must be aware of the order of the items of SWB measures in a questionnaire, related to the information supplied by previous questions. Global and specific measures of Satisfaction with Life show different results, suggesting that different answering processes produce different answers. Results reaffirm the importance of clearly identify in the studies which type of measure of SWB—global, specific, cognitive, positive affective, negative affective—it is being used in order to avoid apparently contradictory findings in the manipulation of SWB variables. Further study is needed in order to establish the limits of the concept and the relationship between its components.

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