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## INDIVIDUAL QUALITY OF LIFE: CAN IT BE ACCOUNTED FOR BY PSYCHOLOGICAL OR SUBJECTIVE WELL-BEING?

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**ABSTRACT.** There is ongoing discussion in the scientific literature about the need for a more theoretical foundation to underpin quality of life (QoL) measurement. This paper applied Keyes et al.'s [*J. Pers. Soc. Psychol.* 82 (2002) 1007] model of well-being as a framework to assess whether respondents ( $n = 136$  students) focus on elements of subjective well-being (SWB), such as satisfaction and happiness, or on elements of psychological well-being (PWB), such as meaning and personal growth, when making individual QoL (IQoL) judgments using the Schedule of the Evaluation of Individual Quality of Life (SEIQoL). The Keyes et al.'s model was confirmed and explained 41% of the variance in SEIQoL scores. Both SWB and PWB were correlated with the SEIQoL Index Score and SWB was found to be an important mediating variable in the relationship between PWB and SEIQoL. When analyzing different well-being combinations, respondents with high SWB/high PWB had significantly higher SEIQoL scores than did those with low SWB/low PWB. Respondents with high PWB/high SWB had higher SEIQoL scores than did those with high PWB/low SWB. Longitudinal studies in different patient groups are needed to explore the dynamic relationship between IQoL and well-being. Further investigation of the relationship between PWB and SWB with other instruments purporting to measure QoL would contribute to an enhanced understanding of the underlying nature of QoL.

**KEY WORDS:** individual quality of life, psychological well-being, SEIQoL, subjective well-being, SEM, theoretical model

### 1. INTRODUCTION

The individual quality of life (IQoL) approach is one of several current approaches to measurement of QoL (Bowling, 2001; Joyce et al., 1999). In recent decades, there has been a dramatic increase in the development of QoL instruments for use in clinical trials and other outcome studies (Garratt et al., 2002). Although there is widespread agreement about the importance of QoL assessment in healthcare, few researchers provide a definition of the concept or state the theoretical model of QoL underpinning the assessments they use (Patrick and Chiang, 2000). Questions of instrument validity arise, in part, from the fact that most of these instruments have been derived from

health status scales or from population indices developed in the social sciences. As Prutkin argues, they presume that “a person’s QoL is a state of health and not a state of mind” (Prutkin and Feinstein, 2002).

Most existing QoL instruments are expert-driven, i.e., items have been generated by researchers and physicians and may not reflect the perspectives of the public. Many measures used in healthcare are based on the health-related quality of life (HRQoL) approach, which seeks to limit the focus to those aspects of life that might be affected by a disease and treatment (Ware, 2003). Many are based on the assumption that the importance of different components of QoL is the same for all individuals. This assumption is contradicted by empirical findings showing that the definition of QoL is highly specific and that individuals vary in the relative values they attach to different aspects of life. An alternative approach is to use individualised QoL instruments that, typically, do not limit the focus of enquiry to health and are based on a phenomenological approach that seeks to understand how individuals perceive and make judgments about their QoL (Joyce et al., 2003). Individualised QoL (IQoL) measures are designed to increase respondents’ discretion in selecting the areas of life (domains) that are most important and/or determining the relative importance of these domains. The degree of individualisation can be put on a continuum, at one end of which are those measures in which the respondent is given neither the option to select the salient domains nor to indicate their relative importance (Dijkers, 2003). Traditional HRQoL instruments such as the SF-36 fall into this category. In contrast, individualised measures such as the Patient Generated Index (PGI) (Ruta et al., 1994) and the Schedule for Evaluation of Individual Quality of Life (SEIQoL) (O’Boyle et al, 1992, 1993) allow the respondent to nominate or select the important domains, rate their level of functioning/satisfaction with each and determine the relative importance (weight) of each.

### 1.1. *Well-being*

QoL has been operationalised using different approaches, for example based on social indicators, subjective well-being (SWB), or economic indices (Diener and Fujita, 1997). The social indicators approach focuses on social statistics and its impact on people’s QoL. This approach is historically based on Bentham’s ideas of choosing public policies that will maximise the net good (Michalos, 1980). The SWB approach focuses on happiness and/or satisfaction with life and has been widely used to assess QoL (Diener, 2000). The use of QoL assessments within the field of economics is increasingly

used to compare the effects of different drugs or health care intervention by calculating quality adjusted life years (QALYs) (Drummond et al., 1999).

Measures used to assess QoL are usually based on patient reported outcomes (PROs) (Wiklund, 2004). Different scales might purport to measure dimensions as varied as the ability to function, achievement of goals, hopes and expectations, human flourishing, social utility, capabilities, life satisfaction, happiness and well-being. In this paper, we are interested in further exploring the relationship between QoL operationalised as individualised QoL and QoL operationalised as well-being. Current research on well-being has been derived from two general perspectives: the hedonic approach (subjective well-being – SWB), which focuses on happiness and satisfaction and defines well-being in terms of pleasure attainment and pain avoidance; and the eudaimonic approach (psychological well-being – PWB), which focuses on meaning and self-realisation and defines well-being in terms of the degree to which a person is fully functioning (Ryan and Deci, 2001). A number of measures of SWB have been developed in the social indicators research tradition (Prutkin and Feinstein, 2002) and several measures of PWB are available from the psychological research literature (Naughton and Wiklund, 1993; Ryff and Singer, 1996).

Current QoL measures have focused more on SWB than PWB, although some studies using PWB have been conducted (Hart et al., 2005). This might be due partly to the widespread translation of *eudaimonia* to mean happiness instead of striving to realise one's true potential (Hudson, 1996). However, Ryff has argued that QoL assessments need to take PWB into account as well (Ryff and Singer, 2002). Although the two well-being traditions have evolved separately, there is evidence for a connection between the two. Together, these traditions might provide a complementary perspective and a more holistic opportunity to examine what makes life good. Keyes et al have incorporated SWB and PWB into different models (Keyes et al., 2002). These models were based on SWB being defined as positive and negative affect and life satisfaction and PWB being defined, according to the eudaimonic principle, as including 6 dimensions: self-acceptance, environmental mastery, positive relations, purpose in life, personal growth and autonomy. They offered two models named "Model 4" where PWB and SWB are correlated yet distinct in content and "Model 6" where there is a partial overlapping of SWB and PWB. They state that although Model 6 provided a better fit to the data than did Model 4, both may serve as a basis for further inquiries. Their results support a dualistic well-being/QoL approach integrating SWB and PWB and confirming that these constructs are not interchangeable. Keyes et al. further conclude that both forms of well-being

can be construed as antecedent, consequent or even as mediating variables depending on one's guiding theory. This new combined model is sophisticated, has a strong theoretical basis and may provide a theoretical basis for understanding and measuring QoL in healthcare (Taillefer et al., 2003).

### 1.2. *IQoL and well-being*

The SEIQoL is a widely used individualised QoL instrument (Joyce et al., 1999). This measure is based on the phenomenological definition that: "QoL is what the respondent says it is". To further understand the process involved in QoL assessment using SEIQoL, it would be interesting to analyze the relationship between this measure and other approaches to assessing QoL. How do people completing the SEIQoL conceptualise their QoL? Do they associate it more with happiness and life satisfaction or with personal strivings or do they view it as a combination of these approaches? Kind and Napa (Boon and Stewart, 1998) found that both meaning in life and happiness are essential to the folk concept of QoL or the "good life". Based on these findings and the definition of IQoL as "QoL is what the respondent says it is", it might be reasonable to expect that IQoL can be influenced both by SWB and PWB. To our knowledge, no previous study has assessed whether individuals assessing IQoL make their judgments on the basis of SWB, PWB or both. The aim of this study was to test the two models offered by Keyes et al., i.e., Model 4 (PWB and SWB not overlapping) and Model 6 (partial overlapping of SWB and PWB) (Keyes et al., 2002) and to examine the relationship between PWB and SWB, as outlined in Keyes et al.'s models, and IQoL.

## 2. METHODS

### 2.1. *Participants*

The sample consisted of university students from the Royal College of Surgeons in Ireland (RCSI). Students were invited to participate in the study as a class exercise. Participation was voluntary and anonymous. Ethical approval was obtained from the College's Research Ethics Committee (Application No. 075).

### 2.2. *Individual quality of life*

IQoL was assessed using the Schedule for the Evaluation of Individual Quality of Life (SEIQoL) (McGee et al., 1991; O'Boyle et al., 1993). The

SEIQoL was administered as a semi-structured interview in a group setting with the following introduction:

“For each of us, quality of life depends on those parts or areas of life which are important to us. When these important areas are present or going well, we are generally happy but when they are absent or going badly we feel worried or unhappy. In other words, these important areas of life determine the quality of our lives. What is considered important varies from person to person. That which is most important to you may not be so important to your husband/ wife/ children/ parents/ friends, and vice versa.

We are interested in knowing what the most important areas of your life are at the moment. Most of us don't usually spend a lot of time thinking about these things. Indeed, we often only notice that certain things are important when something happens to change them. Sometimes it is easier to identify what is important by thinking about the areas of life that would (or do) cause us most concern when they are missing or going badly.”

Individuals are first asked to nominate and describe the five areas of their lives (cues) they consider to be the most central to their QoL at the moment. Next they assess their current status or level of satisfaction/functioning on each cue using a visual analogue scale. The third stage involves a weighting procedure designed to examine the importance attached by the individual to each cue. This procedure is based on Judgment Analysis, a method derived from Social Judgment Theory. It makes use of multiple regression analysis to model the structure of an individual's “judgment policy” by quantifying the weight s/he gives to each cue in judging the QoL associated with 30 hypothetical cases. By examining its importance, this step quantifies the relative contribution of each cue to the individual's judgment of his or her overall QoL. Since the individual is not explicitly asked to rank the importance of each cue, the derived values are considered to incorporate implicit (“unconscious”) elements into the weighting procedure (Browne et al., 1997). Where grouped data are needed, a single score (the SEIQoL index score) can be derived by multiplying each cue weight by its corresponding level and summing the products across the five cues. The scale scores vary from 0.0 to 100.0 with higher scores representing higher QoL.

### 2.3. *Psychological well-being*

PWB was measured by the short form of the Psychological Well-being Questionnaire (Ryff and Keyes, 1995). It includes six scales: self-acceptance, environmental mastery, positive relations with others, personal growth, purpose in life and autonomy. Each scale consists of three items, with a mix of positive and negative items. On a scale from 1 to 6, respondents indicate whether they agree or disagree (strongly, moderately or slightly) that an item

describes how they think or feel. The range for each scale is 3–18, with higher scores indicating higher PWB. The PWB-short form was previously used to confirm the proposed theoretical structure of PWB and SWB and it has acceptable psychometric properties for a short form questionnaire (Ryff and Keyes, 1995). For the analysis of different well-being combinations of PWB, we summed the PWB scales (alpha coefficient of overall scale = 0.77).

#### 2.4. *Subjective well-being*

SWB was measured using the Satisfaction with Life Scale (SWLS) (Diener et al., 1985) and the Positive and Negative Affectivity Scale (PANAS) (Crawford and Henry, 2004).

The SWLS measures life satisfaction as a cognitive-judgmental process using a multi-item scale consisting of five statements with a seven-point rating scale ranging from strongly disagree to strongly agree. This scale ranges from 5 to 35 with higher scores indicating higher SWLS. It assesses the respondent's life as a whole. It does not assess satisfaction with life domains such as health or finances but allows respondents to integrate and weight domains in whatever way they choose. It is the recommended scale to assess an individual's conscious evaluative judgment of his or her life using their own criteria.

The PANAS was used to assess happiness. It consists of 20 words describing emotions: 10 positive and 10 negative (Watson et al., 1988). Each emotion is rated to indicate 'to what extent you feel this way' on a five-point rating scale ranging from 'very slightly' or 'not at all' to 'extremely'. The scales range from 10 to 50 with higher scores indicating higher negative or positive affect. In this study, "the present" (today) was chosen as the reference time point. The timeframe is one of the most important features to consider when deciding how to assess emotion. The shorter the timeframe, the more likely one is to capture emotional responses; the longer the timeframe, the more likely one is to capture mood or personality differences in emotionality (Watson et al., 1988).

For the analysis of different well-being combinations, we summed the measures of SWB (alpha coefficient of overall scale = 0.56). Because the measures of SWB (PANAS and SWLS) consisted of different numbers of items (positive affect = 10 items, negative affect = 10 items, and life satisfaction = 5 items), we divided each measure's score by the number of items before summing so that the measures were given equal presence in the overall SWB score.

### 2.5. *Data analysis*

Analyses were conducted using Amos 4 and SPSS 11.5.

### 2.6. *Correlations between IQoL and well-being*

The bivariate correlations for the indicators of IQoL and well-being were calculated.

### 2.7. *Structural equation modelling (SEM)*

Structural equation modelling (SEM) was used to test Keyes' theoretical models (Model 4 and Model 6) (Keyes et al., 2002) against the observed dataset. SEM is a combination of factor analysis and path analysis and is described in detail elsewhere (Arbuckle and Wothke, 1999; Brown and Cudeck, 1993; Byrne, 2001; Kline, 1998). SEM is more a confirmatory than exploratory technique, as it compares a hypothesised model's covariance matrix with that of observed data. Typically, this approach allows a more "causal" explanation of findings. There are several steps which need to be considered when applying SEM: (1) developing a model based on theory, (2) identifying the unique values which can be used for the parameters to be estimated in the theoretical model, (3) applying various estimation techniques, e.g., maximum likelihood, (4) testing the fit of the model against the data. Based on findings, the researcher can (5) modify the measurement model based on theoretical justifications; re-specify the model by adding, deleting or modifying relationships between latent variables in the model or using measures indicating lack of fit for specific parts of the model when theoretically justified (Bollen and Long, 1993).

The advantage of SEM over standard regression methods is that it is a theory driven approach. It allows for simultaneous evaluation of a set of measurement models and path coefficients. The resulting prediction equations are, thus, a more accurate representation of the true causes of variation in the dependent variable than, for instance, is stepwise regression. Latent constructs, such as SWB and PWB, are assessed by two or more measured variables. Structural path coefficients reflect associations between latent constructs or between single-indicator predictors and latent constructs. SEM encompasses two major components: (1) measurement models (e.g., confirmatory factor analysis) and (2) structural path components (e.g., regression analysis). In our analysis, we used both measurement models and

structural path components to build a full latent variable model (Byrne, 2001) and a hybrid model (Kline, 1998).

Before the full latent variable model was tested, each measurement model (e.g., PWB, SWB) included in the full model was tested separately assuring its fit, following the two-step approach recommended by Anderson (1988). This involved an evaluation of the hypothesis that the indicated measured items or scales reflected the latent constructs. Models for each construct were defined by permitting each of the relevant test items or scale scores to load on a single factor representing the latent construct it was hypothesised to measure.

Goodness-of-fit (GFI) indices were used as indicators of model fit. Chi-square ( $\chi^2$ ) was used as an index of the significance of discrepancy between the original (sample) correlation and matrix from the (population) correlation matrix estimated from the model. Because  $\chi^2$  is dependent on sample size, the comparative fit index (CFI) and the root mean square error approximation (RMSEA) were further considered. CFI values are derived from the comparison of the hypothesised model with the independence model. RMSEA values help to answer the question "How well would the model, with unknown, but optimally chosen parameter values, fit the population covariance matrix if it were available?" (Byrne, 2001). The lower the discrepancy measured by the RMSEA the better, with RMSEA = 0.0 indicating a perfect fit. Acceptable values are CFI > 0.90, and for RMSEA < 0.08. For the comparison of models we used  $\chi^2$  statistics.

### 2.8. *Mediator effect*

In order to further assess the relationship between PWB, SWB and IQoL, a detailed analysis of possible mediating effects were undertaken following the steps initially outlined by Baron and Kenny (Kaplan and Baron-Epel, 2003). A variable is a mediator when it meets the following three conditions: regressing the mediator onto the independent variable (IV); regressing the dependent variables (DV) onto the IV; and regressing the DV on both the IV and the mediator. It must be demonstrated that there is, first, an association between the IV and the mediator; then an association between the IV and the DV; and, finally, an association between the mediator and DV. If these conditions hold and the effect of the IV on the DV is less in the third equation, then it can be said that there is evidence for mediation. Perfect mediation holds if the independent variable has no effect when the mediator is controlled.



### 2.9. *Well-being combinations*

We also examined whether the off-diagonal well-being combinations, i.e., high and low SWB and PWB groups, were related to the SEIQoL Index mean scores. Tertiles for the SWB and PWB scales were computed, coding each scale into low (first tertile), middle (second tertile), and upper (third tertile). These analyses focused on the outer cells with extreme combinations (low SWB/low PWB; low SWB/high PWB; high SWB/low PWB and high SWB/high PWB). The proportion of respondents having  $PWB > SWB$  (i.e., modPWB + lowSWB, highPWB + lowSWB, highPWB + modSWB) and the proportion having  $SWB > PWB$  (i.e., modSWB + lowPWB, highSWB + lowPWB, highSWB + modPWB) were calculated. Statistical significance was tested using Kruskal–Wallis and the Mann–Whitney test.

## 3. RESULTS

### 3.1. *Participants*

One hundred and thirty-six students (62% women, mean age 21.4 years  $\pm$  SD 2.8) completed the questionnaire. They were a culturally diverse group consisting of Europeans (30%), Asians (40%), and Middle Easterners (12%), and also 10% of the respondents originated from North America, Australia and New Zealand and 3% from the rest of the world. The mean SEIQoL index score was 65.1 ( $\pm$  13.2 SD) (range 28–97; possible range: 0–100). The validity of the SEIQoL judgment analysis procedure, as indicated by  $R^2$ , was acceptable ( $0.63 \pm$  SD 0.15). Test–retest reliability of the 10 repeated cases was 0.59.

### 3.2. *Correlations between IQoL and well-being*

Table I presents the bivariate correlations for the indicators of IQoL and well-being. All indicators were inter-correlated to a small or modest degree in the expected direction, with the exception of environmental mastery and purpose in life, which did not correlate with each other. Expected correlations were found between the SEIQoL index score and all the PWB scales ( $r = 0.26$  to  $0.43$ , all  $p < 0.01$ ) and the SWB scales ( $r = -0.40$  to  $0.54$ , all  $p < .01$ ). These bivariate correlations suggest some shared variance among the measures.

### 3.3. *Factor analysis*

Confirmatory factor analysis was used to test explicitly the theoretical relationships of the latent structure of PWB and SWB both separately and

TABLE I  
Correlations between SEIQoL and PWB and SWB measures

Instrument Scale	Possible range	Min	Max	Mean ± SD	1	2	3	4	5	6	7	8	9	10		
1 PWB	Autonomy	5	18	13.40	2.73	–										
2 PWB	Environmental Mastery	6	18	13.06	2.73	0.42**	–									
3 PWB	Personal Growth	9	18	16.16	1.96	0.23**	0.38**	–								
4 PWB	Positive Relationships	6	18	13.90	3.18	0.31**	0.44**	0.40**	–							
5 PWB	Purpose in Life	3	18	14.90	2.54	0.19*	0.15 <sup>ns</sup>	0.40**	0.33**	–						
6 PWB	Self-acceptance	6	18	13.58	3.05	0.33**	0.54**	0.38**	0.44**	0.38**	–					
7 PANAS	Negative Affectivity Scale	9	41	17.01	6.42	-0.29**	-0.47**	0.35**	-0.28**	-0.32**	-0.39**	–				
8 PANAS	Positive Affectivity Scale	13	56	32.81	7.65	0.18*	0.45**	0.39**	0.33**	0.29**	0.38**	-0.24**	–			
9 SWLS	Satisfaction with Life Scale	6	35	23.33	6.29	0.24**	0.58**	.43**	0.46**	0.19*	0.64**	-0.37**	0.37**	–		
10 SEIQoL Index Score	SEIQoL Index Score	[0–100]	28.86	97.6	65.05	13.22	0.27**	0.39**	.29**	0.26**	0.28**	0.43**	-0.4**	0.31**	0.54**	–

Note. PWB = psychological well-being, SWB = subjective well-being, PANAS = positive and negative affectivity scale, SWLS = satisfaction with life scale, SEIQoL = schedule for evaluation of individual quality of life.

combined (Table II). The fit indices showed an acceptable fit of the theoretical structure of the instrument ( $\chi^2 = 23.20$ ,  $df = 9$ ,  $p < 0.01$ ,  $GFI = 0.95$ ,  $CFI = 0.92$   $RMSEA = 0.11$ ). The fit of the model is perfect, since it is a saturated model with  $df = 0$  ( $\chi^2 = 0$ ,  $df = 0$ ,  $p = ns$ ,  $GFI = 1$ ,  $CFI = 1$   $RMSEA = n/a$ ).

### 3.4. Structural equation modelling (SEM)

SEM was first used to test Keyes et al.'s models. We tested their Model 4 (non-overlapping PWB and SWB) and Model 6 (partial overlapping PWB and SWB) as possible models. The fit of Model 4 ( $\chi^2 = 51.8$ ,  $df = 26$ ,  $p < .01$ ,  $GFI = 0.89$ ,  $CFI = 0.91$   $RMSEA = .09$ ) was however not as good as the fit of Model 6 ( $\chi^2 = 48.34$ ,  $df = 24$ ,  $p < 0.01$ ,  $GFI = 0.92$ ,  $CFI = 0.93$   $RMSEA = 0.08$ ). We choose to proceed only with Model 6 as this was also the best fitting model in the original paper by Keyes et al (2002).

The result based on Model 6 (Figure 1) showed an acceptable fit. Following this, the SEIQoL index score was entered into this model ( $\chi^2 = 61.8$ ,  $df = 31$ ,  $p < 0.01$ ,  $GFI = 0.92$ ,  $CFI = 0.92$ ,  $RMSEA = 0.08$ ) (Figure 1). The model explained 41% of variance of the SEIQoL index score (SWB  $\beta = 0.83$ ,  $p < 0.001$ ; PWB  $\beta = -24$ ,  $p = 0.44$ ). There was no significant difference between the fit of these two models  $\chi^2 = 13.46$ ,  $p = 0.062$ .

TABLE II  
Confirmatory factor analysis of Ryff's and Keyes' PWB and SWB scales

	Factor loading – PWB ( $\beta$ -weights)	Factor loading – SWB ( $\beta$ -weights)
Autonomy	0.499	
Purpose in life	0.464	
Personal growth	0.592	
Positive relationships with others	0.646	
Environmental mastery	0.694	
Self-acceptance	0.732	
Satisfaction with life		0.765
Positive affectivity		0.482
Negative affectivity		-0.490

Note. PWB = psychological well-being, SWB = subjective well-being.

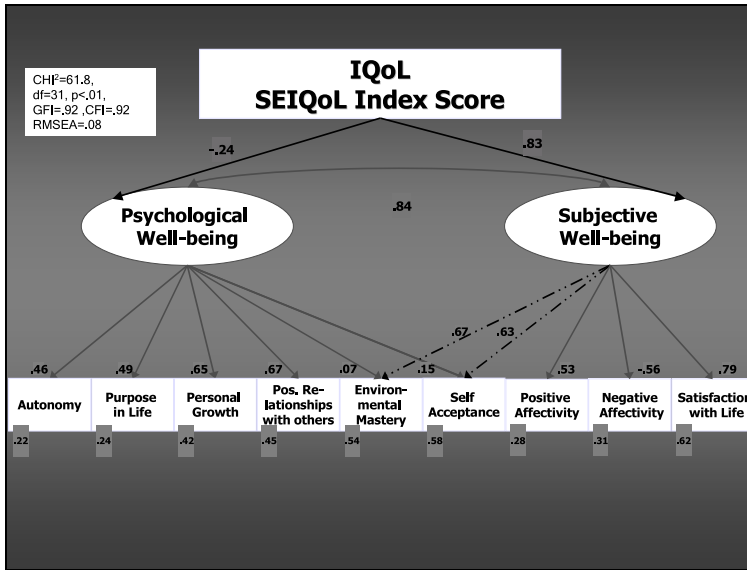


Fig. 1. Structural equation model of the relationship of psychological and subjective well-being with individual quality of life (IQoL), based on Keyes et al.'s Model 6 (2002). SEIQoL = schedule for evaluation of individual quality of life.

3.5. Mediator approach

A mediator moderator approach was tested regarding SWB and PWB as independent variables and IQoL as the dependent variable (Figure 2). There was an association between the independent variable (PWB) and the mediator (SWB) 0.74 ( $p = 0.001$ ) and an association between the independent variable (PWB) and the dependent variable (IQoL) 0.47 ( $p = 0.001$ ). In the final model, there was no significant effect of the independent variable (PWB) on the dependent variable (IQoL) ( $0.07, p = 0.48$ ). The relationship of PWB on IQoL was mediated by SWB.

3.6. Off-diagonal combinations of well-being

Analysis of the off-diagonal groupings of SWB and PWB in relation to the mean SEIQoL index score (Figure 3) showed that those with high SWB and high PWB had significantly higher SEIQoL scores than those with low SWB and low PWB. Respondents with high PWB and high SWB had higher SEIQoL scores than those with high PWB and low SWB. There was no difference in SEIQoL scores for those with low PWB and low SWB compared to those with low PWB and high SWB.

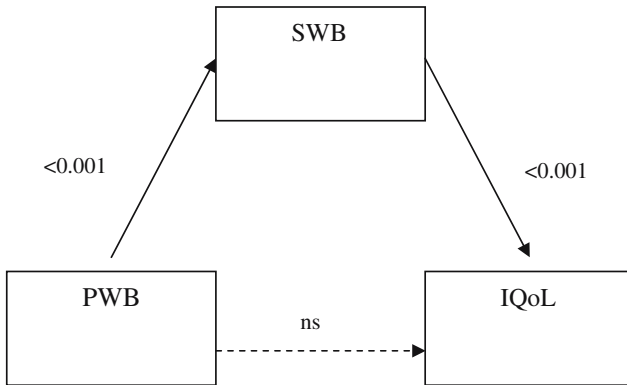


Fig. 2. Mediating model of SWB, PWB and IQoL. SWB = subjective well-being, PWB = psychological well-being, IQoL = individual quality of life.

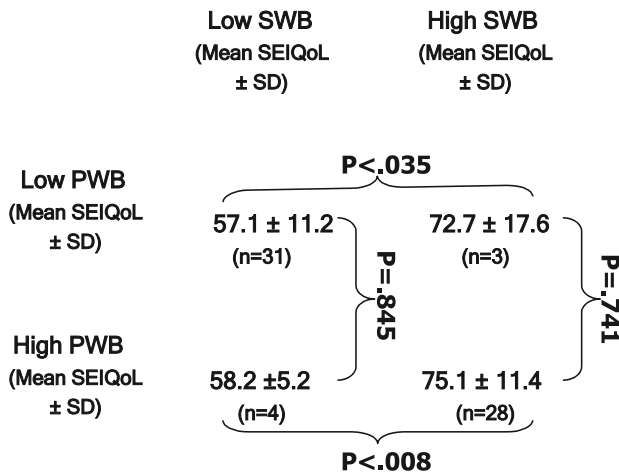


Fig. 3 Well-being groupings of SWB and PWB related to mean SEIQoL scores. SWB = subjective well-being, PWB = psychological well-being, SEIQoL = schedule for evaluation of individual quality of life. SWB – we divided the scales by the number of items that composed each scale (positive affect = 10, negative affect = 10, and life satisfaction = 5. Low and high SWB is defined as lower, respectively, upper tertile scores. PWB – The six PWB scales developed by Ryff were summed. Low and high PWB is defined as lower, respectively, upper tertile scores. Off-diagonal comparisons showed that those with lowSWB/lowPWB had significantly lower SEIQoL scores than those with highSWB/highPWB ( $p < 0.001$ ).

The mean SEIQoL score for those with SWB > PWB was 66.7 (SD = 12.3,  $n = 30$ ) and the mean SEIQoL score for those with PWB > SWB was 62.8 (SD = 12.6,  $n = 24$ ). However, there was not enough power to detect differences in scores between these groupings.

#### 4. DISCUSSION

In this study, we investigated the relationship between PWB, SWB and individual QoL. In this study the Satisfaction with Life Scale (SWLS) (Diener et al., 1985) and the Positive and Negative Affectivity Scale (PANAS) (Crawford and Henry, 2004) were used to assess SWB, whereas the measures used by Keyes et al. (2002) were a single item measure of global life satisfaction and scales of positive and negative affect. PWB assessment was identical, i.e., Ryff and Keyes' (1995) short-form six scales of PWB (Keyes et al., 2002; Ryff and Keyes, 1995). The confirmatory factor analysis showed very similar regression weights for the majority of the PWB and SWB scales as those published by Keyes et al. (2002) in their Model 6. This match was evident even though we used a different set of instruments to assess SWB than Keyes et al. One scale, the environmental mastery scale did not load on PWB as in their model. This may be because of the composition of our study population. University students may not have had the same lifetime opportunity to exert strong influence on their immediate environment as did the general population in Keyes et al.'s sample. Nevertheless, since we tested Keyes et al.'s Model 6 in a different and culturally diverse population, and with some different assessment instruments, our overall findings add empirical support to their Model 6, since we confirmed their proposed dualistic PWB/SWB model of in our study population. SEM analysis allowed identification of non-fitting models. Testing alternative models, such as allowing all nine indicators of PWB and SWB to load separately onto the SEIQoL Index Score, showed that Keyes et al.'s Model 6 had the best fit, thus further confirming this model. We encounter the problem identified by Keyes et al (Keyes et al., 2002, p. 1012), i.e., although Model 6 provided a better fit to the data than did Model 4, both may serve as a basis for further enquiring. Keyes et al. (2002) identified Model 4 as more useful than Model 6 for several reasons – one being that Model 4 maintains the conceptual differentiation between SWB and PWB. In Model 6, environmental mastery and self-acceptance are common indicators of the two constructs. Thus, further longitudinal investigation of Model 4 and Model 6 in different patient groups is needed in order to inform these issues.

Our hypothesis that SEIQoL would capture aspects of both PWB and SWB was confirmed. We found that the concept of IQoL, as assessed by SEIQoL, was not redundant when measured in association with PWB and SWB. However, it appears that IQoL primarily relates to SWB, which mediates the PWB/IQoL relationship. The well-being combination analyses showed further support for the fact that SWB seems to have a stronger

influence on the mean SEIQoL score. In this study, we had enough power to detect large effects. It would be of interest, however, to study further the distribution of SEIQoL scores according to different well-being combinations in larger and more varied populations.

The finding that the SEIQoL was more strongly associated with SWB might be due to the framing of the introduction to the SEIQoL interview. Here the concept of happiness is explicitly mentioned by the interviewer in relation to QoL but PWB domains such as meaning and personal growth are not mentioned. Respondents appear to focus on satisfaction and happiness when responding to the question – “How are you doing in your chosen life areas?” This result gives new information about ongoing cognitive or emotional processes when individuals assess their IQoL using the SEIQoL. This brings light into the “SEIQoL black box”, i.e., what is happening when respondents complete SEIQoL. It also highlights the importance of how to frame the SEIQoL introduction. In another initiative being developed based on the SEIQoL, respondents are asked about the five most important areas affecting their *meaning* in life [Borasio, G. personal communication, 2005].

Our data fitted a model in which IQoL is primarily reflected through SWB, which again is influenced by PWB. However, the variance explained by SEIQoL in this model was only 41%. These findings raise the question as to whether, and to what extent, IQoL is driven primarily by SWB. This issue needs to be explored in a longitudinal study design. Future studies could relate global QoL measures other than SEIQoL, e.g. Spitzer’s Uniscale (Spitzer, 1987) and the WHOQoL (Skevington et al., 2004) to the PWB/SWB model.

#### 4.1. *Implications*

Our results suggest different ways to improve or maintain high IQoL. Since PWB is mediated by SWB, one option for improving QoL would be to develop interventions using techniques such as PWB therapy (Fava and Ruini, 2003). Increasing PWB would then have an effect on SWB and, through this, on IQoL as well. Fava et al.’s therapy focuses on improving the six domains in Ryff’s PWB measure. These authors have shown that cognitive behavioural therapy gives longstanding positive results, superior to drug-only therapy in depressed patients (Fava and Ruini, 2003). Another option might be to focus directly on improving aspects of SWB such as happiness and life satisfaction. Seligman has proposed several different techniques to improve what he calls ‘authentic happiness’ (Seligman, 2002).

His model of authentic happiness reflects the developing positive psychology movement and is an example of a “combined theory approach” (Seligman, 2002) that takes pleasures, gratifications and a meaningful life into account. He proposes that positive emotions can be directed to the past, present and future. In the present, individuals can opt either for pleasures (bodily pleasures such as taste, smell and sex or higher pleasures such as ecstasy, bliss and gladness) or for gratifications (activities which absorb and engage fully such as reading, climbing and dancing). He defines the *pleasant life* as “a life that successfully pursues the positive emotions about the present, past and future”, and the *good life* as “using your signature strengths to obtain abundant gratification in the realms of your life”. Gratification is not equal to happiness but is, rather, similar to the Aristotelian notion of Eudaimonia. A full life includes the *meaningful life*, which involves “using one’s signature strengths and virtues in the service of something much larger than yourself”. Seligman’s notion of authentic happiness includes aspects of both SWB and PWB and he has developed several strategies to improve authentic happiness (Seligman, 2002). Interestingly, Ryff et al. found that higher PWB is associated with lower levels of biomarkers such as cortisol, pro-inflammatory cytokines and cardiovascular risk, compared with those having lower PWB. However, different levels of SWB had almost no association with biomarker assessments (Ryff et al., 2004).

## 5. CONCLUSION

We confirmed Keyes et al. proposed Model 6 in our study population by showing that SWB and PWB are distinct but related concepts. SEIQoL scores were correlated both with SWB and PWB. However, SWB was found to be an important mediating variable between PWB and IQoL. Although the SEIQoL has previously been administered successfully in small group settings with senior managers (O’Boyle et al., 2004), this study showed that it could be successfully administered in a large group setting. However, the study does not inform us about how participants perceive the complex cognitive task involved in the SEIQoL procedure. Future studies in different patient populations, should consider this further, by using, for example, CASM techniques like the “think aloud” approach (McColl et al., 2003) or Rapkin’s appraisal model to find out more about specific IQoL appraisal process (Rapkin and Schwartz, 2004). Also, further investigation of the relationship of PWB and SWB with instruments purporting to measure QoL would help elucidate the cognitive and affective components of QoL.



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