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Individual quality of life: can it be accounted for by psychological or subjective well-being?

Lena Ring

Royal College of Surgeons in Ireland

Stefan Hofer

Royal College of Surgeons in Ireland

Hannah McGee

Royal College of Surgeons in Ireland

Anne Hickey

Royal College of Surgeons in Ireland

Ciaran O'Boyle

Royal College of Surgeons in Ireland

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L. RING, S. HÖFER, H. MCGEE, A. HICKEY and C. A. O'BOYLE

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INDIVIDUAL QUALITY OF LIFE: CAN IT BE ACCOUNTED

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FOR BY PSYCHOLOGICAL OR SUBJECTIVE WELL-BEING?

6

(Accepted 2 July 2006)

7

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

24

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

26
27

1. INTRODUCTION

28

29 The individual quality of life (IQoL) approach is one of several current
30 approaches to measurement of QoL (Bowling, 2001; Joyce et al., 1999). In
31 recent decades, there has been a dramatic increase in the development of
32 QoL instruments for use in clinical trials and other outcome studies (Garratt
33 et al., 2002). Although there is widespread agreement about the importance
34 of QoL assessment in healthcare, few researchers provide a definition of the
35 concept or state the theoretical model of QoL underpinning the assessments
36 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



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

40 Most existing QoL instruments are expert-driven, i.e., items have been
 41 generated by researchers and physicians and may not reflect the perspectives
 42 of the public. Many measures used in healthcare are based on the health-
 43 related quality of life (HRQoL) approach, which seeks to limit the focus to
 44 those aspects of life that might be affected by a disease and treatment (Ware,
 45 2003). Many are based on the assumption that the importance of different
 46 components of QoL is the same for all individuals. This assumption is
 47 contradicted by empirical findings showing that the definition of QoL is
 48 highly specific and that individuals vary in the relative values they attach to
 49 different aspects of life. An alternative approach is to use individualised
 50 QoL instruments that, typically, do not limit the focus of enquiry to health
 51 and are based on a phenomenological approach that seeks to understand
 52 how individuals perceive and make judgments about their QoL (Joyce et al.,
 53 2003). Individualised QoL (IQoL) measures are designed to increase
 54 respondents’ discretion in selecting the areas of life (domains) that are most
 55 important and/or determining the relative importance of these domains. The
 56 degree of individualisation can be put on a continuum, at one end of which
 57 are those measures in which the respondent is given neither the option to
 58 select the salient domains nor to indicate their relative importance (Dijkers,
 59 2003). Traditional HRQoL instruments such as the SF-36 fall into this
 60 category. In contrast, individualised measures such as the Patient Generated
 61 Index (PGI) (Ruta et al., 1994) and the Schedule for Evaluation of Indi-
 62 vidual Quality of Life (SEIQoL) (O’Boyle et al, 1992, 1993) allow the
 63 respondent to nominate or select the important domains, rate their level of
 64 functioning/satisfaction with each and determine the relative importance
 65 (weight) of each.

66 1.1. *Well-being*

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



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

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

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

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

119 1.2. IQoL and well-being

120 The SEIQoL is a widely used individualised QoL instrument (Joyce et al.,
 121 1999). This measure is based on the phenomenological definition that: "QoL
 122 is what the respondent says it is". To further understand the process
 123 involved in QoL assessment using SEIQoL, it would be interesting to ana-
 124 lyze the relationship between this measure and other approaches to assessing
 125 QoL. How do people completing the SEIQoL conceptualise their QoL? Do
 126 they associate it more with happiness and life satisfaction or with personal
 127 strivings or do they view it as a combination of these approaches? Kind and
 128 Napa (Boon and Stewart, 1998) found that both meaning in life and hap-
 129 piness are essential to the folk concept of QoL or the "good life". Based on
 130 these findings and the definition of IQoL as "QoL is what the respondent
 131 says it is", it might be reasonable to expect that IQoL can be influenced both
 132 by SWB and PWB. To our knowledge, no previous study has assessed
 133 whether individuals assessing IQoL make their judgments on the basis of
 134 SWB, PWB or both. The aim of this study was to test the two models offered
 135 by Keyes et al., i.e., Model 4 (PWB and SWB not overlapping) and Model 6
 136 (partial overlapping of SWB and PWB) (Keyes et al., 2002) and to examine
 137 the relationship between PWB and SWB, as outlined in Keyes et al.'s
 138 models, and IQoL.

139 2. METHODS

140 2.1. Participants

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

146 2.2. Individual quality of life

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



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

151 “For each of us, quality of life depends on those parts or areas of life which are important to us.
152 When these important areas are present or going well, we are generally happy but when they are
153 absent or going badly we feel worried or unhappy. In other words, these important areas of life
154 determine the quality of our lives. What is considered important varies from person to person.
155 That which is most important to you may not be so important to your husband/ wife/ children/
156 parents/ friends, and vice versa.
157 We are interested in knowing what the most important areas of your life are at the moment.
158 Most of us don’t usually spend a lot of time thinking about these things. Indeed, we often only
159 notice that certain things are important when something happens to change them. Sometimes it
160 is easier to identify what is important by thinking about the areas of life that would (or do)
161 cause us most concern when they are missing or going badly.”

162

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

181 2.3. *Psychological well-being*

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



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


195 2.4. *Subjective well-being*

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

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

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

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

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226 2.5. *Data analysis*

227 Analyses were conducted using Amos 4 and SPSS 11.5.

228 2.6. *Correlations between IQoL and well-being*229 The bivariate correlations for the indicators of IQoL and well-being were
230 calculated.231 2.7. *Structural equation modelling (SEM)*

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

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


260 structural path components to build a full latent variable model (Byrne,
261 2001) and a hybrid model (Kline, 1998).

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

270 Goodness-of-fit (GFI) indices were used as indicators of model fit. Chi-
271 square (χ^2) was used as an index of the significance of discrepancy between
272 the original (sample) correlation and matrix from the (population) corre-
273 lation matrix estimated from the model. Because χ^2 is dependent on
274 sample size, the comparative fit index (CFI) and the root mean square
275 error approximation (RMSEA) were further considered. CFI values are
276 derived from the comparison of the hypothesised model with the inde-
277 pendence model. RMSEA values help to answer the question “How well
278 would the model, with unknown, but optimally chosen parameter values,
279 fit the population covariance matrix if it were available?” (Byrne, 2001).
280 The lower the discrepancy measured by the RMSEA the better, with
281 RMSEA = 0.0 indicating a perfect fit. Acceptable values are CFI > 0.90,
282 and for RMSEA < 0.08. For the comparison of models we used χ^2
283 statistics.

284 2.8. Mediator effect

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

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298 2.9. *Well-being combinations*

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

310

3. RESULTS

311 3.1. *Participants*

312 One hundred and thirty-six students (62% women, mean age
 313 21.4 years \pm SD 2.8) completed the questionnaire. They were a culturally
 314 diverse group consisting of Europeans (30%), Asians (40%), and Middle
 315 Easterners (12%), and also 10% of the respondents originated from North
 316 America, Australia and New Zealand and 3% from the rest of the world.
 317 The mean SEIQoL index score was 65.1 (\pm 13.2 SD) (range 28–97; possible
 318 range: 0–100). The validity of the SEIQoL judgment analysis procedure, as
 319 indicated by R^2 , was acceptable ($0.63 \pm$ SD 0.15). Test–retest reliability of
 320 the 10 repeated cases was 0.59.

321 3.2. *Correlations between IQoL and well-being*

322 Table I presents the bivariate correlations for the indicators of IQoL and well-
 323 being. All indicators were inter-correlated to a small or modest degree in the
 324 expected direction, with the exception of environmental mastery and purpose
 325 in life, which did not correlate with each other. Expected correlations were
 326 found between the SEIQoL index score and all the PWB scales ($r = 0.26$ to
 327 0.43 , all $p < 0.01$) and the SWB scales ($r = -0.40$ to 0.54 , all $p < .01$). These
 328 bivariate correlations suggest some shared variance among the measures.

329 3.3. *Factor analysis*

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

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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	[3-18]	5	18	13.40	2.73	-								
2 PWB	[3-18]	6	18	13.06	2.73	0.42**	-							
3 PWB	[3-18]	9	18	16.16	1.96	0.23**	0.38**	-						
4 PWB	[3-18]	6	18	13.90	3.18	0.31**	0.44**	0.40**	-					
5 PWB	[3-18]	3	18	14.90	2.54	0.19*	0.15 ^{ns}	0.40**	0.33**	-				
6 PWB	[3-18]	6	18	13.58	3.05	0.33**	0.54**	0.38**	0.44**	0.38**	-			
7 PANAS	[5-50]	9	41	17.01	6.42	-0.29**	-0.47**	0.35**	-0.28**	-0.32**	-0.39**	-		
8 PANAS	[5-50]	13	56	32.81	7.65	0.18*	0.45**	0.39**	0.33**	0.29**	0.38**	-0.24**	-	
9 SWLS	[7-35]	6	35	23.33	6.29	0.24**	0.58**	0.43**	0.46**	0.19*	0.64**	-0.37**	0.37**	-
10 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.



332 combined (Table II). The fit indices showed an acceptable fit of the theo-
 333 retical structure of the instrument ($\chi^2 = 23.20$, $df = 9$, $p < 0.01$,
 334 $GFI = 0.95$, $CFI = 0.92$ $RMSEA = 0.11$). The fit of the model is perfect,
 335 since it is a saturated model with $df = 0$ ($\chi^2 = 0$, $df = 0$, $p = ns$,
 336 $GFI = 1$, $CFI = 1$ $RMSEA = n/a$).

337 *3.4. Structural equation modelling (SEM)*

338 SEM was first used to test Keyes et al.'s models. We tested their Model 4
 339 (non-overlapping PWB and SWB) and Model 6 (partial overlapping PWB
 340 and SWB) as possible models. The fit of Model 4 ($\chi^2 = 51.8$, $df = 26$,
 341 $p < .01$, $GFI = 0.89$, $CFI = 0.91$ $RMSEA = .09$) was however not as
 342 good as the fit of Model 6 ($\chi^2 = 48.34$, $df = 24$, $p < 0.01$, $GFI = 0.92$,
 343 $CFI = 0.93$ $RMSEA = 0.08$). We choose to proceed only with Model 6 as
 344 this was also the best fitting model in the original paper by Keyes et al
 345 (2002).

346 The result based on Model 6 (Figure 1) showed an acceptable fit. Fol-
 347 lowing this, the SEIQoL index score was entered into this model
 348 ($\chi^2 = 61.8$, $df = 31$, $p < 0.01$, $GFI = 0.92$, $CFI = 0.92$,
 349 $RMSEA = 0.08$) (Figure 1). The model explained 41% of variance of the
 350 SEIQoL index score (SWB $\beta = 0.83$, $p < 0.001$; PWB $\beta = -24$, $p = 0.44$).
 351 There was no significant difference between the fit of these two models
 352 $\chi^2 = 13.46$, $p = 0.062$.

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

	Factor loading – PWB (β -weights)	Factor loading – SWB (β -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.

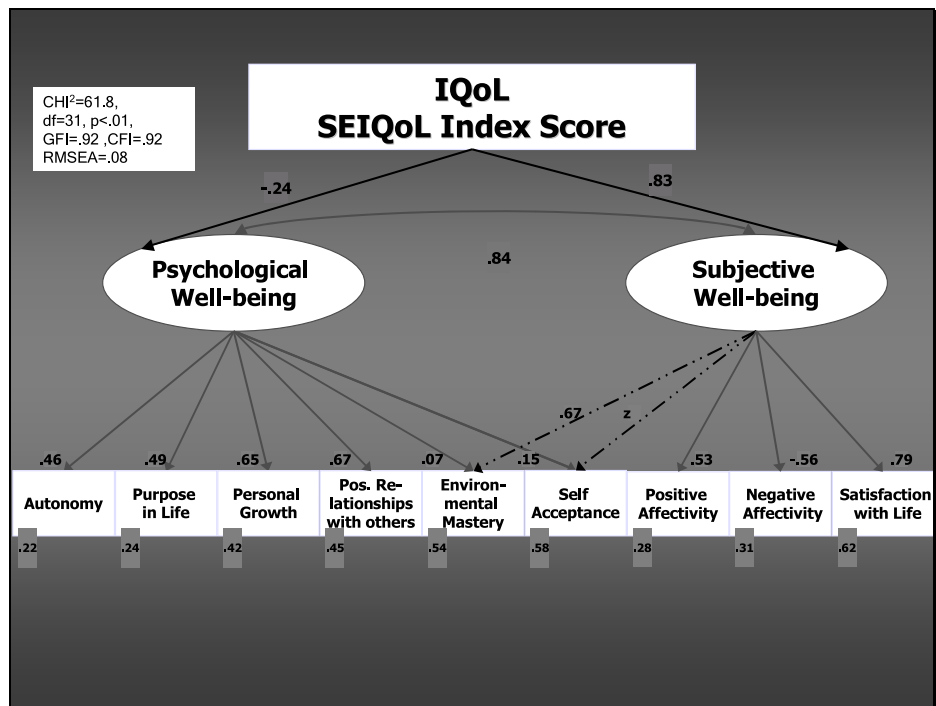


Fig. 1. Structural equation model of the relationship of psychological and subjective well-being with individual quality of life (IQoL), based on Keyes et al.'s Model 6 (2002). SEIQoL = schedule for evaluation of individual quality of life.

353 3.5. Mediator approach

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

362 3.6. Off-diagonal combinations of well-being

363 Analysis of the off-diagonal groupings of SWB and PWB in relation to the
 364 mean SEIQoL index score (Figure 3) showed that those with high SWB and
 365 high PWB had significantly higher SEIQoL scores than those with low SWB
 366 and low PWB. Respondents with high PWB and high SWB had higher
 367 SEIQoL scores than those with high PWB and low SWB. There was no
 368 difference in SEIQoL scores for those with low PWB and low SWB com-
 369 pared to those with low PWB and high SWB.

IQoL: PWB OR SWB?

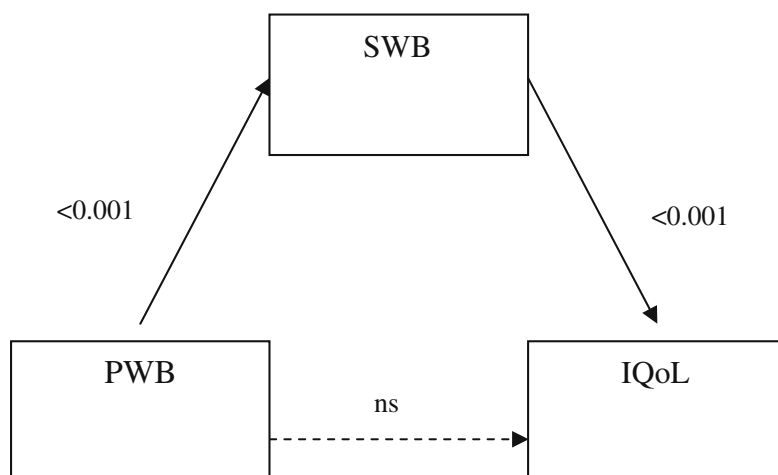


Fig. 2. Mediating model of SWB, PWB and IQoL. SWB = subjective well-being, PWB = psychological well-being, IQoL = individual quality of life.

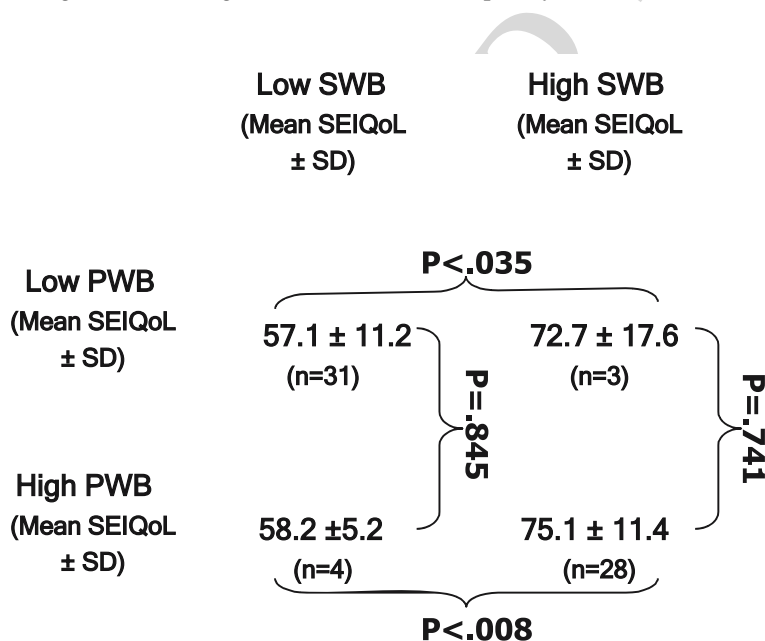



Fig. 3 Well-being groupings of SWB and PWB related to mean SEIQoL scores. SWB = subjective well-being, PWB = psychological well-being, SEIQoL = schedule for evaluation of individual quality of life. SWB – we divided the scales by the number of items that composed each scale (positive affect = 10, negative 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 ($p < 0.001$).

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

375 In this study, we investigated the relationship between PWB, SWB and
 376 individual QoL. In this study the Satisfaction with Life Scale (SWLS)
 377 (Diener et al., 1985) and the Positive and Negative Affectivity Scale
 378 (PANAS) (Crawford and Henry, 2004) were used to assess SWB, whereas
 379 the measures used by Keyes et al. (2002) were a single item measure of
 380 global life satisfaction and scales of positive and negative affect. PWB
 381 assessment was identical, i.e., Ryff and Keyes' (1995) short-form six scales of
 382 PWB (Keyes et al., 2002; Ryff and Keyes, 1995). The confirmatory factor
 383 analysis showed very similar regression weights for the majority of the PWB
 384 and SWB scales as those published by Keyes et al. (2002) in their Model 6.
 385 This match was evident even though we used a different set of instruments to
 386 assess SWB than Keyes et al. One scale, the environmental mastery scale did
 387 not load on PWB as in their model. This may be because of the composition
 388 of our study population. University students may not have had the same
 389 lifetime opportunity to exert strong influence on their immediate environ-
 390 ment as did the general population in Keyes et al.'s sample. Nevertheless,
 391 since we tested Keyes et al.'s Model 6 in a different and culturally diverse
 392 population, and with some different assessment instruments, our overall
 393 findings add empirical support to their Model 6, since we confirmed their
 394 proposed dualistic PWB/SWB model of in our study population. SEM
 395 analysis allowed identification of non-fitting models. Testing alternative
 396 models, such as allowing all nine indicators of PWB and SWB to load
 397 separately onto the SEIQoL Index Score, showed that Keyes et al.'s Model
 398 6 had the best fit, thus further confirming this model. We encounter the
 399 problem identified by Keyes et al (Keyes et al., 2002, p. 1012), i.e., although
 400 Model 6 provided a better fit to the data than did Model 4, both may serve
 401 as a basis for further enquiring. Keyes et al. (2002) identified Model 4 as
 402 more useful than Model 6 for several reasons – one being that Model 4
 403 maintains the conceptual differentiation between SWB and PWB. In Model
 404 6, environmental mastery and self-acceptance are common indicators of the
 405 two constructs. Thus, further longitudinal investigation of Model 4 and
 406 Model 6 in different patient groups is needed in order to inform these issues.
 407 Our hypothesis that SEIQoL would capture aspects of both PWB and
 408 SWB was confirmed. We found that the concept of IQoL, as assessed by
 409 SEIQoL, was not redundant when measured in association with PWB and
 410 SWB. However, it appears that IQoL primarily relates to SWB, which
 411 mediates the PWB/IQoL relationship. The well-being combination analyses
 412 showed further support for the fact that SWB seems to have a stronger

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

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

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

439 4.1. Implications

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



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451 His model of authentic happiness reflects the developing positive psychology
 452 movement and is an example of a “combined theory approach” (Seligman,
 453 2002) that takes pleasures, gratifications and a meaningful life into account.
 454 He proposes that positive emotions can be directed to the past, present and
 455 future. In the present, individuals can opt either for pleasures (bodily
 456 pleasures such as taste, smell and sex or higher pleasures such as ecstasy,
 457 bliss and gladness) or for gratifications (activities which absorb and engage
 458 fully such as reading, climbing and dancing). He defines the *pleasant life* as
 459 “a life that successfully pursues the positive emotions about the present, past
 460 and future”, and the *good life* as “using your signature strengths to obtain
 461 abundant gratification in the realms of your life”. Gratification is not equal
 462 to happiness but is, rather, similar to the Aristotelian notion of Eudaimonia.
 463 A full life includes the *meaningful life*, which involves “using one’s signature
 464 strengths and virtues in the service of something much larger than yourself”.
 465 Seligman’s notion of authentic happiness includes aspects of both SWB and
 466 PWB and he has developed several strategies to improve authentic happi-
 467 ness (Seligman, 2002). Interestingly, Ryff et al. found that higher PWB is
 468 associated with lower levels of biomarkers such as cortisol, pro-inflamma-
 469 tory cytokines and cardiovascular risk, compared with those having lower
 470 PWB. However, different levels of SWB had almost no association with
 471 biomarker assessments (Ryff et al., 2004).

472 5. CONCLUSION

473 We confirmed Keyes et al. proposed Model 6 in our study population by
 474 showing that SWB and PWB are distinct but related concepts. SEIQoL
 475 scores were correlated both with SWB and PWB. However, SWB was
 476 found to be an important mediating variable between PWB and IQoL.
 477 Although the SEIQoL has previously been administered successfully in
 478 small group settings with senior managers (O’Boyle et al., 2004), this study
 479 showed that it could be successfully administered in a large group setting.
 480 However, the study does not inform us about how participants perceive the
 481 complex cognitive task involved in the SEIQoL procedure. Future studies
 482 in different patient populations, should consider this further, by using, for
 483 example, CASM techniques like the “think aloud” approach (McColl et al.,
 484 2003) or Rapkin’s appraisal model to find out more about specific IQoL
 485 appraisal process (Rapkin and Schwartz, 2004). Also, further investigation
 486 of the relationship of PWB and SWB with instruments purporting to
 487 measure QoL would help elucidate the cognitive and affective components
 488 of QoL.



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603
 604 *Health Services Research Centre,*
 605 *Department of Psychology*
 606 *Royal College of Surgeons in Ireland*
 607 *Dublin 2, Ireland*


L. Ring,
 S. Höfer,
 H. McGee,
 A. Hickey,
 C. A. O'Boyle,
 L. Ring

613 *Pharmaceutical Outcomes Research,*
 614 *Department of Pharmacy, BMC*
 615 *Uppsala University*
 616 *Box 580, 751 23,*
 617 *Uppsala, Sweden*
 618 *E-mail: lena.ring@farmaci.uu.se*
 619 *Tel.: +46-18-4714495*
 620 *Fax: +46-18-4714223*

621
 622
 623 *Department of Medical Psychology and Psychotherapy*
 624 *Medical University Innsbruck*
 625 *Innsbruck, Austria*

S. Höfer

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