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How is subjective well-being related to quality of life?

Do we need two concepts and both measures?

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Abstract

Subjective well-being (SWB) and subjective quality of life (QoL) are key concepts describing experience, capacities, states, behaviours, appraisals, and emotional reactions to circumstances. Used widely in public discourse, policy, and research, their theoretical and empirical relations remain little explored. The present research aimed to develop an integrated model of SWB and QoL through empirically testing its overlapping and exclusive dimensions.

Survey data was obtained from N = 2,533 in 11 countries. Adults completed the WHOQOL Spirituality, Religion and Personal Beliefs (SRPB) instrument which assesses 33 QoL facets in 6 domains. The facets operationalise components of the hedonic SWB model, extended with eudaimonia, as SWB+. Network analyses, and regression models with random effect for cultural centre, assessed the differential contributions of SWB+ and QoL in predicting general QoL, explanatory power, and model parsimony.

When all SWB+ and QoL variables are assessed together, the final model explains more variance in general QoL than either of the competing models; also it shows the most parsimonious fit. This fully integrated model contains only positive feelings from SWB+, with 13 other QoL facets drawn from all six domains when adjusted for health status and educational level.

These findings provide the foundation for a new *Life Quality and Well-being (LQW)* model that awaits confirmation. The LQW improves on existing models of SWB+ and QoL by better explaining general QoL than facets of either model on their own. The 14 selected facets potentially offer a new, single measure with considerable conceptual breadth, and international foundations.

How is subjective well-being related to quality of life?

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1. Introduction

Subjective well-being (SWB) and subjective quality of life (QoL) are often used interchangeably in research, policy, and practice. For example, when announcing a strategy to assess outcomes *"beyond economic prosperity"*, UK Prime Minister David Cameron (2010) commissioned a *"new way of measuring wellbeing in Britain."…"We'll start measuring our progress as a country, not just by how our economy is growing, but by how our lives are improving; not just by our standard of living, but by our quality of life."* [https://www.gov.uk/government/speeches/pm-speech-on-wellbeing]

Quality of life and SWB are not interchangeable terms as they are connected to different theoretical concepts (Stewart-Brown, 2015). Undifferentiated discussion and use, create confusion about whether they are theoretically different, similar or the same (Camfield & Skevington, 2008; Peasgood, Brazier, Mukaria et al, 2014), and confounds debates on happiness (World Health Organisation, 2015), and mental health (Böhnke & Croudace, 2016; Hinks, Tinkler & Allin, 2013). Furthermore QoL and SWB support separate measurement fields that are usually underpinned by theory, so measurement choice is complicated. Confusion has not been remedied by an apparent lack of research awareness about findings in the other field. Well-being specialists rarely acknowledge QoL measures (e.g. Triandis, 2000; Diener, Helliwell & Kahneman, 2010), and QoL experts often overlook SWB models, so debate is hindered. As person-centred approaches are now favoured for monitoring and evaluating international outcomes, and informing global policy-making in health care, and beyond (Stiglitz, Sen & Fitoussi, 2009; Skevington & Epton, 2018), an international

investigation could accelerate resolution of this conundrum, leading to better decision-making in future.

THEORETICAL BACKGROUND: SUBJECTIVE WELL-BEING & QUALITY OF LIFE

Historically, philosophy on the 'good life' was dichotomised into the pleasures and enjoyment of 'hedonia', and the flourishing, purposeful life of 'eudaimonia' (Bentham, 1789). Representing a largely hedonic position, Diener (1984) defined SWB as central to a person's experience consisting of positive aspects, and a global assessment of a person's life. In 1995, negative affect, and cognitive evaluations were added to this definition of SWB: "*Subjective well-being also includes cognitive evaluations or appraisals of life satisfaction as a whole, and emotional reactions to life events"* (Diener & Diener, 1995). Developed measures based on SWB models prompted copious research (Busseri & Sadava, 2011; Hinks, Tinkler & Allin, 2013), and showed some cross-cultural support (e.g. Oishi, 2010). Nevertheless, how SWB relates to quality of life (QoL) remains obscure.

Among other definitions, subjective QoL was defined in 1994 by an international World Health Organisation (WHO) research collaboration as:

> *An individual's perception of their position in life, in the context of the culture and value systems in which they live, and in relation to their goals, expectations, standards and concerns. It is a broad-ranging concept, incorporating in a complex way the person's physical health, psychological state, level of independence, social relationships, personal beliefs, and relationship to salient features of the environment. (*p 43) (The World Health Organisation Quality of Life Assessment Group, (WHOQOL) 1994).

This definition underpins the WHO model that was designed to improve QoL measurement cross-culturally (table 1; Skevington, Sartorius, Amir et al, 2004; Bowden & Fox-Rushby, 2003).

INSERT TABLE 1 HERE

Since publication of these definitions, several questions have been raised, and discrepancies highlighted; these issues informed the current research. First, it was proposed to incorporate an existential eudaimonic element on a 'purposeful and worthwhile life' into SWB (Keyes, Shmotkin & Ryff, 2002). This was drawn from the psychological well-being (PWB) model (Ryff, 1989), and is related to SWB (Ring, Hofer, McGee, et al, 2006). In the present study we investigate the SWB model expanded by this eudaimonic element, and refer to it as SWB+.

Second, another revision of SWB replaced the 1995 version with a more abstract, generic statement: *"An umbrella term for different valuations that people make regarding their lives, the events that happen to them, their bodies and minds, and the circumstances in which they live"* (Diener, Kahneman, Graham, et al, 2005). Increased similarity between this new SWB definition and the earlier WHO definition (The WHOQOL Group, 1994), suggested that the SWB concept could be converging towards QoL. Revealing greater common ground, this similarity raised questions about whether both constructs might be embraced by a single, unified concept, and if so, whether one instrument could measure it? Investigating these questions has potential to resolve some of the confusion about these concepts and their measures in health, and beyond.

Third, the structure of the SWB model was questioned through a major review of findings from over 1000 studies (Busseri & Sadava, 2011). While evidence largely supports core elements of SWB (positive affect, negative affect, and life satisfaction), Busseri and

Sadava reported that a significant minority of studies showed small, insignificant associations between SWB components. Examining five plausible configurations of SWB's components, they could not confirm that one single model was the 'best', and concluded that full endorsement was 'premature' (Busseri & Sadava, 2011). For the present study this raised questions about plausible alternative models.

Fourth, short-comings in predicting well-being from 'objective' indices like income, wealth, and material goods, led Nobel laureate economists to recommend subjective multidimensional measures like SWB to the global community:

> *Research has shown that it is possible to collect meaningful and reliable data on subjective, as well as objective wellbeing. Subjective wellbeing encompasses different aspects (cognitive evaluations of one's life, happiness, satisfaction, positive emotions such as joy and pride, and negative emotions such as pain and worry): each of them should be measured separately, to derive a more comprehensive appreciation of people's lives.* (Stiglitz, Sen & Fitoussi, 2009)

Despite contemporary interest in evaluating well-being by Western governments (e.g. Office of National Statistics in UK (2011)), relations between models and measures of SWB and QoL have not been closely examined with global data (Skevington & Epton, 2018).

Lastly, language versions of the new SWB measures have not been developed using advanced cultural-adaptation procedures that improve equivalence when comparing different language versions (Herdman, Fox-Rushby, & Badia, 1997). The SWB concept and measure were originally designed in USA. As no other cultures contributed to the derivation of conceptual meanings and item wording, subsequent translations are not entirely compatible

with the original. The simultaneous 'spoke-wheel' cross-cultural methodology designed by the WHOQOL Group and used to develop its suite of measures, is geared to making multiple language versions more equivalent than previously (Skevington, 2002).

AIMS OF THIS STUDY

We aimed to improve understanding about the empirical relationship between SWB and subjective QoL. Arising from the questions and discrepancies, we predicted that these two perspectives would not be entirely exclusive, and would display evidence of overlapping components. As positive feelings/affect is both important to SWB and QoL, and as happiness stands alone in its own field of study, we predicted this component would be an area of commonality.

More importantly we predicted that an overarching subjective framework for SWB and QoL could plausibly be merited, and refer to this as the "*Life Quality and Well-being" (LQW) model*. Any such model would potentially represent a new perspective that could be prospectively tested. As expected from an overarching concept, we predicted that the LQW model would include a wide-range of facets, possibly drawn from each domain. The present research represents a typical, single-sample test of a pre-defined framework that derives its specific strength from applying an internationally diverse sample.

2. Methods

2.1 Design

Cross-sectional WHOQOL SRPB data was collected simultaneously within 18 cultures world-wide, following an internationally agreed protocol (The World Health Organisation Quality of Life Assessment – Spirituality, Religion and Personal Beliefs Group (WHOQOL SRPB), 2006). Quota sampling was applied to culture (240 adults per centre),

age-band (50%; split at 45 years), and gender (50%). Representative sampling was not feasible, as national statistics necessary to design a sampling frame were not available for every participating country.

2.2 Sample

The full WHOQOL SRPB dataset (*N*= 5,087; 18 centres) was originally used to investigate psychometric properties of the WHOQOL SRPB instrument (The WHOQOL SRPB Group, 2006). In the present study we conduct secondary analysis on a subset of this data. Some centres were excluded: (i) where data was entirely missing for a variable crucial to hypothesis testing (i.e. spiritual/general facets: China, Kenya, Argentina); (ii) if 'clean' country samples were unduly small (Japan, *n*=43; Italy, *n*=101), or (iii) if national data was collected by more than one centre, duplicating its contribution (Brazil, India). Where the latter occurred, data from the primary national centre was preferred to maintain comparison with previous research. Selection resulted in analysing *N* = 2,533 cases contributed by 11 culturally diverse centres located in *South America:* Porto Alegre, Brazil; Calabria, Uruguay; *Middle East:* Alexandria, Egypt; Beer Sheva, Israel; *Northern Europe:* Vilnius, Lithuania; Bath, UK; *Southern Europe*: Barcelona, Spain; Izmir, Turkey; *South Asia*: Kubang, Malaysia; Bangkok, Thailand; and the *Sub-continent*: Bangalore, India.

The total sample contained 51% women, and 48% men, with ages ranging from 16 to 90 (53.7% < 45 years). Highest educational level completed was: 18.5% primary, 40.2% secondary, 29.5% tertiary, and 11.4% postgraduate. Forty-four percent reported an illness and the primary illness was classified as: high blood pressure (14%), cardiac (12%), musculoskeletal (9%), cancer (8%), respiratory (6%), broken/fractured bone (6%), diabetes (5%), HIV (2%), rectal growth/bleeding (2%), cataract (1%), Parkinson's disease (1%) or stroke (.4%). The total sample contained agnostics, atheists, Buddhists, Zen Buddhists,

Muslims, Hindus, Jews, Christians, and indigenous beliefs (The WHOQOL SRPB Group, 2006).

Ethical approval for the study was granted by the Ethics committee of the World Health Organisation, Geneva to the WHO Division of Mental Health and Substance Abuse. The protocol conformed to Declaration of Helsinki principles. Local ethical approval was also obtained in all field sites.

2.3 Measures

The original WHOQOL-100 was developed by an international multi-centre collaboration, following standard, agreed protocols, to obtain a validated set of 100 items that assess 25 facets of QoL (The WHOQOL Group, 1998; Monod, Brennan, Rochat, et al, 2011). The WHOQOL SRPB instrument analysed in the current study combines the WHOQOL-100 items with an additional module of 32 items organized in eight facets. These extra 'SRPB' facets elaborate QoL outcomes from spiritual, religious and personal beliefs (The WHOQOL SRPB Group, 2006; see table 1). The WHOQOL SRPB is scored in six QoL domains. The WHOQOL-SRPB aligns with the SWB+ model, as it contains two facets assessing positive and negative feelings (hedonia), and two facets on meaning in life and purpose in life (eudaimonia).

All WHOQOL instruments also contain an overarching, general QoL and health facet (g facet).This was developed as an internal validity criterion within the original WHOQOL-100 protocol (The WHOQOL Group, 1998). Several 5-point interval, response scales enable upper to lower poles of well-being to be rated. Some item scores are reversed so that high total scores consistently indicate good QoL.

Due to its international, multi-stakeholder development, the WHOQOL-100 and WHOQOL SRPB have high content validity, and relevance. The construct validity of these

facets and domains (dimensions) has been the subject of several WHOQOL-100 and WHOQOL SRPB studies. Across these findings, items within facets, and facets within domains correlate highly, and show high reliabilities, but inter-domain correlations are high also, potentially pointing to one or two general QoL latent variables (e.g., O'Connell & Skevington, 2010; Chan, Skevington, & Verplanken, 2017; Krägeloh, Billington, Henning, et al. 2015).

Additional data collected with the WHOQOL SRPB were self-reported health (rated from 1=very poor, to 5 very good), present/absent current illness, and socio-demographic variables of gender, age, marital status, and educational level.

2.4 Analysis Plan

With its additional 32 items, the WHOQOL SRPB provides a set of validated facets that are broader than the SWB+ model, and revisiting the WHOQOL SRPB survey (The WHOQOL SRPB Group, 2006) offered a unique chance to conduct an international test of the proposed LQW model. We were interested in the relative importance of the WHOQOL SRPB facets when predicting the g facet; of four items, two are on general QoL, and one each on health, and life satisfaction.

While in our study life satisfaction is part of the dependent variable, as seen in some SWB+ models (e.g. Busseri & Sadava, 2011), other WHOQOL SRPB facets were mapped conceptually onto key SWB+ components as potential predictor variables. Positive feelings of happiness and contentment (e.g. '*How much do you experience positive feelings in life?')* operationalize positive affect. Negative feelings (e.g. anxiety and depression) operationalize negative affect (e.g. '*How often do you experience negative feelings?'*). Together these mood facets from the psychological domain represent hedonia (see table 1). It was unclear whether a 'worthwhile life' of eudaimonia would be best operationalized by purpose in life (e.g. '*To*

what extent do you feel that life has a purpose?'), or meaning in life facets (e.g. *'To what extent do you find your life to be meaningful?')*; consequently both spiritual facets were included for comparison. Some SWB models incorporate 'cognitive evaluation' which could have been operationalized by the cognitions facet, but this was rejected due to inconsistent inclusion in SWB models (Busseri & Sadava, 2011). Although the WHOQOL SRPB does not directly assess 'subjective well-being' as a facet *per se*, models tested in the present study are commensurate with Diener's indirect assessment of SWB via its components (Diener, Suh, Lucas, et al., 1999).

Facets of the WHOQOL SRPB were scored according to the assessment protocol. Health influences assessment of QoL, and is included within the general facet of the WHOQOL SRPB. However as health is not recognised as a formal SWB+ component, it was controlled as a covariate by including the independent health status rating, and current illness measures. Marital status was recoded as living together/married (1) vs. single, separated, divorced or widowed (0). As educational level varies considerably across countries, it was recoded as an ordinal variable: primary (0), secondary (1), and university/post-graduate (2).

a. Network Analysis

Before conducting the mixed-effects regression, we used a network model (Costantini, et al., 2015; Kossakowski et al., 2016) to descriptively analyse the undirected relationships between all facets and control variables, and also to evaluate the plausibility of the g facet as a dependent variable. Network models represent spatial interrelations between variables in a set, as a collection of 'nodes' (circles represent observed variables) and 'edges' (lines represent the strength of relationships between variables, 'weights'; see figure 1). Two quantitative measures provide insight into the relative associations between variables: (i) the higher the 'closeness' of a variable, the more and stronger correlational paths connect this variable to all

other network variables, and (ii) the higher the 'betweenness' of a variable, the more shortest paths between two variables pass through this variable (see details in Costantini et al., 2015). The size of both statistics depends on the number of nodes, and weights (correlations) applied, and is not interpreted.

To take account of the nested structure of the data, we determined the within-country pair-wise correlation matrix by separating the correlations between variables into their intra-class, within- and between-country correlations (R Core Team, 2017; Revelle, 2017). Network analysis was performed on the estimated within-country correlation matrix (Epskamp et al., 2012). First, a network was estimated of the bivariate correlations - a purely descriptive presentation of the data. Second, we estimated a network of partial correlations, where the correlation between two variables is controlled for all other network variables (with LASSO regularisation to control for overfitting). This network allows us to assess which nodes are still connected to the g facet, after controlling for all variables, i.e. which have uniquely predictive power; also to evaluate whether several item groups exist, representing different content.

b. Mixed Model Regression Analysis

We then conducted mixed model regression analysis to evaluate the differential predictive value of facets. From total respondents in 11 centres, 87% completed data for every analysed variable. Most missing values were for education level (n_{Miss}=179), then sex-life (n_{Miss}=62), being currently ill (n_{Miss}=28), and faith (n_{Miss}=12). All other variables showed less than 10 missing. Multiple imputation by chained equations was applied (Azur, Stuart, Fangakis, et al., 2011), to provide multivariate predictions of missing values, which assumes data are randomly missing (Rubin, 1976). All variables included in the full regression model were used for the imputation. Fixed effects for survey centre (culture) were added into the

prediction (Azur, Stuart, Fangakis, et al., 2011). Ordinary least squares regression was used for continuous variables; ordinal logistic regression for the 5-point health status rating, and educational level. Logistic regression was used for all dichotomous variables (gender, marital status, education, currently ill). Prediction model parameters were estimated through sampling with replacement using 20 "burn-in" iterations, after random starting values for each of 20 imputed data sets were generated.

Modelling was conducted in four stages with the aim of comprehensively testing relations between SWB+ and QoL models. First, socio-demographic and health variables alone were examined in model 1, to control for inter-individual differences, and assess the variance in the general facet due to these variables. This variable block was retained within each subsequent model. Second, variance explained by the four key SWB+ components alone, was tested in model 2. For model 3, variance explained by QoL variables that were **not** included in model 2, was now examined. Finally, a full model (model 4) examined the variance explained by every SWB+, QoL and demographic/health variable together. Since relevant facets for each model (SWB+, QoL) are identified by prior theory, variable selection was not performed.

Data analysis used a mixed-model with fixed effects for all regressors, and a random effect for survey centre (culture) to account for clustering of sample cultures. To fit the models, first the Monte Carlo error for the estimated coefficients across the 20 imputed datasets was evaluated, providing the variance due to the imputation design. For randomly selected imputed data sets, R^2 was calculated between model predictions, and the non-imputed original g facet scores. Information criteria (AIC, BIC; Sclove, 1987; Wagenmakers & Farrell, 2004) compared models containing more predictors with less, to ascertain whether those with more parameters remained parsimonious (i.e. lower values). Additionally, Likelihood ratio tests compared the absolute fit between models with increasing numbers of

predictors, to provide important information about whether the full, final model containing every variable (i.e. model 4), showed improved fit over SWB+ variables alone (model 2), and QoL variables alone (model 3). Regression analyses were performed in Stata 14 (College Station, TX, 2015).

3.0 Results

Figure 1 presents the network based on bivariate correlations between variables. Paths between two variables ("edges") represent direct correlations. Green edges represent positive, and red edges negative correlations; wider edges indicate stronger correlation between two variables. The spatial distance between variables is optimised by an algorithm that translates the correlation structure as closely as possible onto two-dimensional space, with objects farther away from each other also being less closely related. In this case, the extreme is gender, which shows only one very weak correlation with another variable, and is at maximum distance from all other nodes.

Panel A shows that all QoL facets are closely and positively related. There are potentially two closely related clusters: one focusing on the SRPB components in the WHOQOL SRPB (top nine nodes), and another with all WHOQOL facets not focused on SRPB components (similar to findings by Krägeloh, et al., 2015). The g facet is the most central variable in this network which is also expressed by measures of closeness (.01; followed by positive feelings (.009), and relations (.009)), and betweenness (208; followed by spirit (82), and bodily image (66)).

After controlling for all facets and health variables in Panel B, there are still potentially two clusters in the data, and the g facet assessment sits centrally within this network. The three variables most central to the network are closely linked to this structure: in terms of closeness (shortest and strongest associations); positive feelings (.0018) is most

central, followed by the g facet (.0018), and self-esteem (.0016). In terms of betweenness (more connections between two other nodes through this node), again positive feelings is most central (358), followed by the g facet (262), and hope (160). All identified nodes are close to the bridge between the original WHOQOL-100 items, and SRPB modular items in the WHOQOL SRPB. Based on this descriptive evaluation, the g facet is a plausible validity criterion for our regression models, as it is central in the interrelationships between the facets. Furthermore, SRPB facets appear to offer an assessment slightly different from the g facet, including both facets of meaning and purpose in life (eudaimonia).

INSERT FIGURE 1 HERE

The four regression models are reported in increasing complexity (i.e. left to right) in table 2. Model 1 shows the fit based solely on socio-demographic and health variables. The second model shows demographics with SWB+ variables. The third includes demographics and QoL. Finally, model 4 shows all three aspects together, so examining the *Life Quality and Well-being (LQW)* model. Overall fit statistics (bottom rows: table 2) reveal that demographics alone in model 1, show the worst fit (lowest R^2; highest AIC and BIC). This was followed by model 2 on SWB+ only; then model 3 on QoL alone. The full, final model 4 comprising all three aspects, showed the best fit of all four models. Transforming AIC and BIC values into evidence weights evaluates the relative evidence strength for these four models (Wagenmakers & Farrell, 2004). On both metrics, the evidence weight for model 4 approximates to "1", so affirming the comparative advantage of the full model over all others. The advantage attributed to model 4 is further corroborated by the Likelihood Ratio tests which compared increasing complexity across models. In summary, the results show that separate SWB+ and QoL models fit significantly better than demographics alone, but the full, final model 4 fits significantly better than either of the other two models that exclusively test the facets of either concept.

Table 2 reports unstandardised regression coefficients, and their respective standard errors (SE; brackets). Demographic variables show that the predictive relationship of educational level changes across models. When neither QoL nor SWB+ are included (model 1), highly educated participants reported higher g facet scores compared with those who only completed primary school education. However this effect is not present in model 2, which contains SWB+ predictors. This result shows that when comparing similar well-being levels, educational level does not correlate with the g facet. Also this effect occurs consistently over models 3 and 4 where those with higher and secondary education report lower g facet scores than primary educated participants, but only when broad ranging SWB+ and QoL factors are controlled. Age-band shows small correlations without controlling for QoL, but these vanish when including QoL in models 3 and 4. The variance in the g facet due to age is explained by QoL facets. As expected, both control variables on health (presence of illness; self-rated health) show consistent correlation with the g facet across all four models, although the effect is substantially reduced when SWB+ and/or QoL variables are taken into the models.

Thirteen QoL variables correlated positively and significantly with the g facet, irrespective of whether or not well-being variables were included. Furthermore, these variables are selected from across all six QoL domains, as predicted: energy & fatigue, sleep & rest (physical), self-esteem (psychological), dependence on medication & treatment (independence), personal relationships, practical social support, sex-life (social), perceived home environment, financial resources, access to health & social care, opportunities for recreation & leisure (environment), wholeness & integration, inner peace (spiritual). In the QoL model (model 3), physical safety & security and hope & optimism also positively correlated with the g facet, but cease to be significant predictors when combined with SWB+ indicators in the final regression (model 4).

The picture for SWB+ indicators is different. While all four indicators are significant when run together in a separate model (model 2), only positive feelings showed a significant correlation with the g facet over and above QoL indicators, in the final model (model 4). Variance shared between other indicators of SWB+ (negative feelings, meaning in life, purpose in life) and the g facet appears to be explained by QoL indicators.

The random effects of the mixed model (Table 2; SD (Const) and SD (Residual)) show that relevant, but small cluster effects relating to cultural centre were present between 5% and 9%, across models. Maximal Monte Carlo error (Table 2; MC error) was observed each time for the model intercept, and the next one in size was every time, only one tenth of the maximal value. This means that values for the four models were small, compared to estimated coefficients, indicating little variation across imputation runs. The maximal variance inflation factor (VIF) derived from an ordinary least squares model as an approximation for the (multi-)collinearity of the predictors, was also acceptable for all models. VIFs quantify collinearity of predictors; high collinearity can lead to loss of statistical power (Cohen, Cohen, West, et al., 2003). However as no high VIF coefficients were connected to any SWB+ variable, collinearity is an unlikely alternative explanation of lost significance for SWB+ variables in model 4.

4. Discussion

A review of positions and open questions about the fields of QoL and SWB research led to an inquiry about whether both concepts are needed, and the degree to which they represent complementary perspectives. Consequently we examined the empirical relationship between the two subjective models using international survey data. As person-centred approaches are increasingly used for monitoring and evaluating service outcomes (State of Connecticut Department of Mental Health and Addiction Services, 2014), and informing global policy decisions (Stiglitz, Sen, & Fitoussi, 2009), this work seems timely.

Our findings show that both SWB+ and WHOQOL SRPB QoL facets contribute to the prediction of the g facet, and these range across every WHOQOL domain: energy, sleep (physical domain); positive feelings, self-esteem (psychological); dependence on medication & treatment (independence); personal relationships, social support, sex-life (social relationships); home environment, financial resources, health & social care, recreation & leisure (environment); wholeness, inner peace (spiritual). Several of these variables also played an important role in the descriptive network analysis of facets' interrelations, as well as representing two broad clusters of content identified in that analysis.

Our new, improved and streamlined model of *Life Quality and Well-being (LQW)* therefore integrates 14 facets of subjective QoL (including g facet) drawn from both theoretical formulations. Furthermore we confirm that these facets were derived from six internationally important QoL domains, so offering a holistic model that potentially incorporates SWB+ and offering more comprehensive conceptual coverage than the limited psychological and spiritual components of SWB+. This work also streamlines the 33 facets assessed by the WHOQOL SRPB. We report the first step in evolving a novel, integrated model of life quality and well-being (LQW). This result is important as the sample contained 11 diverse cultures from most inhabited world regions; hence this model approaches 'universal' status.

Model results consistently show that subjective health is important to QoL, and also SWB+ where, although investigated, health has not officially been a component. Subjective health is a predictor in all four regression models, and the network model shows that health-related variables are closely linked to physical QoL facets on medication, activity and mobility. We conclude that the new LQW model should routinely include a 'subjective health' assessment, not just to accommodate theoretical credibility, but also to sensitively adjust scores to health status. This should be done irrespective of whether an assessment is intended

for health use, or other purposes/populations (Camfield & Skevington, 2008). Similarly we note the need to assess educational level which acts as a literacy indicator, and a proxy for poverty, commensurate with other approaches on socio-economic factors.

The regression and network models confirm that positive affect/feelings are a mainstay of both SWB+, and subjective QoL. In network analyses, positive feelings were centrally located, and when assessed in relation to all SWB+ and QoL variables in the final regression model, positive feelings was the only predictive component from four in SWB+, underscoring its central importance in LQW. This result was not unexpected as happiness is routinely assessed in measures and models of well-being, and of QoL within health (e.g. Veenhoven, 2010). It is noteworthy that positive feelings in the WHOQOL combines contentment with happiness, indicating more enduring properties than the ephemeral qualities suggested by mood.

In the SWB+ model alone (model 2), all four variables showed significant predictive values. Positive and negative feelings endorsed a sound hedonic component, and meaning and purpose in life evidenced eudaimonia, strongly supporting SWB+ *per se*. However, neither eudaimonic variable or negative feelings subsequently contributed to predicting the g facet in the final LQW model. Instead two unpredicted spiritual qualities of wholeness/integration, and inner peace emerged as significant. These should be tested further as potential components of eudaimonia within SWB+; also in other populations.

All three facets of the social relationships domain were included in the LQW model, illustrating the core importance of ‘quality ties to others’ (Veenhoven, 2010). Among these, the most important predictor in the final model was personal relations, chiming with interpersonal elements in PWB. As PWB predicts SWB configurations (Ryff & Singer,

435 1998), and may be 'universal' (Veenhoven, 2010), new research is warranted to scrutinise
436 relations between the WHOQOL social domain and PWB.

437 Conceptual convergence between the two models was observed between recent
438 definitions of SWB and QoL, as defined by WHO, revealing common ground. Our findings
439 point to a streamlined, unified but multi-dimensional concept, comprised of a subset of the
440 original facets. When reassessed, these facets should represent a foundation for building one
441 single instrument. The findings also show model overlap, and that some components of both
442 concepts have greater predictive value than others. The empirical research underpinning this
443 newly integrated concept has potential to simplify measurement choice for policy-makers in
444 health, and other applied fields. A trans-disciplinary international collaboration is needed to
445 seek consensus on a single unifying definition, from which new policy and measurement
446 initiatives could flow. Guidance for this work is provided by the LQW model research. Fresh
447 cross-cultural data will be necessary to confirm the LQW model, and provide full
448 psychometric testing of any associated measure.

449 Another implication is that where QoL and well-being need to be measured, an
450 approach combining at least these 14 facets, promises to be more comprehensive, and also
451 theoretically grounded. Pending validation, any such instrument would reduce the twin
452 burdens of administering and completing two or more measures. Organisations (e.g. The
453 Organisation for Economic Co-operation & Development) and governments planning well-
454 being surveys should reconsider whether using SWB+ provides sufficient information to
455 draw confident conclusions about life quality and wellbeing. This is especially important
456 when the costs of gathering large scale survey data are considered (e.g. Gibbons et al., 2016;
457 Stochl et al., 2016).

As the literature reveals unresolved conceptual problems with configuring the SWB model (Busseri & Sadava, 2011), we cannot exclude the possibility that a different configuration of components might better explain our model. There may also be important dimensions beyond these theoretical frameworks, and available WHOQOL facets that warrant testing, and inclusion. However network analysis corroborates the centrality of the g facet among other WHOQOL facets, and therefore choosing any other facet as the criterion would have effectively reduced validity.

Another important observation is that unlike previous approaches, our analysis did not address QoL from a purely operational perspective (Hyland, 1992). Instead the analyses were driven by an inclusive, broad QoL definition (The WHOQOL Group (1994), with an established empirical and theoretical track record. From this perspective, it is arguable that our results indicate a theoretical construct that influences responses to a substantial proportion of the WHOQOL facets. This perspective could guide further investigations into how health, and more broadly personality (e.g. Trompenaars, van Heck, Hodlament et al, 2007), and situational aspects (e.g. Kellert, 2009), influence QoL.

Another limitation is that we used WHOQOL SRPB facets, not item-level analysis. This is especially noteworthy as our dependent variable contains life satisfaction, which in some models is conceptualised within well-being (Busseri & Sadava, 2011). The analysis focused on the WHOQOL SRPB as a validated instrument, and interrelationships between its facets as used in surveys and clinical practice worldwide. Future investigations into the LQW model should revisit the analysis, and potentially develop item content to identify an optimal set of indicators to operationalize the LQW model (see construct validity citations on WHOQOL SRPB in Methods).

Our statistical approach represents an advance in analysing clustered cross-cultural WHOQOL data, and progresses knowledge about what is important to global SWB and QoL. However moderate levels of missing data were necessarily addressed with multiple imputation, and the analysis followed the WHOQOL consortium approach of using the instrument as a conceptually validated instrument for measuring across cultural contexts (see also Gibbons, Skevington & the WHOQOL Group (2017); Theuns et al., (2010)). Despite such limitations, the findings offer insights into a rare cultural range of subjective data.

The primary research strength was access to cross-cultural WHOQOL SRPB data collected contemporaneously in 11 countries world-wide that enables some generalisation of results, and tentative global conclusions. Despite its length, the WHOQOL SRPB is suitable to use in this context as scores are reliable across a profile of facets, and cover key components of the LQW model. A shorter version of the WHOQOL SRPB - the WHOQOL SRPB BREF (Skevington, Gunson, & O'Connell, 2012) - is available, containing 34 items that retain the same conceptual breadth as the long-form. This short-form could be used in the interim, to ease administrative burden until a streamlined version potentially containing 14 facets is standardised in line with the LQW model. Once fresh cross-cultural data has interrogated the global performance of the *Life Quality and Well-being* model, this tailor-made instrument could provide subjective information useful to national and international policy-makers.

References

Azur, M.J., Stuart, L.A., Fangakis, C., & Leaf, P.J. (2011). Multiple imputation by chained equations: what is it and how does it work? *International Journal of Methods in Psychiatric Research, 20,* 1, 40-49 http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3074241/

Bentham, J. (1789). *An Introduction to the Principles of Morals and Legislation*., London, Methuen.

Böhnke, J. R., & Croudace, T. J. (2016). Calibrating well-being, quality of life and common mental disorder items: psychometric epidemiology in public mental health research. *British Journal of Psychiatry, 209,* 2, 162. http://doi.org/10.1192/bjp.bp.115.165530

Bowden, A., & Fox-Rushby, J.A. (2003) A systematic and critical review of the process of translation and adaptation of generic health-related quality of life measures in Africa, Asia, Eastern Europe, the Middle East, South America. *Social Science and Medicine, 57,* 7, 1289-1306.

Busseri, M.A., & Sadava, S.W. (2011). A review of the tripartite structure of Subjective Wellbeing: implications for conceptualisation, operationalization, analysis and synthesis. *Personality and Social Psychology Review, 15,* 3, 290-314.

Camfield, L., and Skevington, S.M. (2008). On subjective well-being and quality of life. *Journal of Health Psychology, 13,* 6, 764-775.

Chan, K., Skevington, S.M., & Verplanken, B. (2017). Cross-cultural application of the WHOQOL SRPB in the Chinese community with diverse spiritual affiliations. *Social Indicators Research, 132,* 1, 291-312. DoI 10.1007/S11205-016-1308-3.

Cohen, J., Cohen, P., West, S.G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences* (3rd edition). Mahwah, NJ: Lawrence Erlbaum Associates.

Costantini, G., Epskamp, S., Borsboom, D., Perugini, M., Mõttus, R., Waldorp, L. J., & Cramer, A. O. J. (2015). State of the aRt personality research: A tutorial on network analysis of personality data in R. *Journal of Research in Personality, 54*, 13–29.

Diener, E. (1984). Subjective well-being. *Psychological Bulletin, 124*, 197-229.

Diener, E., & Diener, C. (1995) The wealth of nations revisited: Income and quality of life. *Social Indicators Research*, 275–286.

Diener, E., Helliwell, J.F., and Kahneman, D. (Eds) (2010) *International Differences in Well-being*. Oxford, Oxford University Press.

Diener, E., Kahneman D., Graham, C., Sirgy, M.J., Krueger. A., King, L., Michelos, A.C., et al. (2005, November). *Guidelines for national indicators of subjective well-being and ill-being.* Social Indicators Network News (*SINET), 84*, 4-6: www.soc.duke.edu/resources/sinet

Diener, E., Suh, E.M., Lucas, R.E. and Smith, H.L. (1999). Subjective wellbeing: three decades of progress. *Psychological Bulletin, 125*, 276-302.

Epskamp, S., Cramer, A. O. J., Waldorp, L. J., Schmittmann, V. D., & Borsboom, D. (2012). qgraph: Network visualizations of relationships in psychometric data. *Journal of Statistical Software*, *48*, 18.

Gibbons, C. J., Skevington, S. M. & the WHOQOL Group (2017). Adjusting for cross-cultural differences in computer-adaptive tests of quality of life. *Quality of Life Research*; Online: December 4th doi.org/10.1007/s11136-017-1738-7

Gibbons, C., Bower, P., Lovell, K., Valderas, J., & Skevington, S. (2016). Electronic quality of life assessment using computer-adaptive testing. *Journal of Medical Internet Research, 18*, e240.

Herdman, M., Fox-Rushby, J., & Badia, X. (1997). 'Equivalence' and the translation and cultural adaptation of health-related quality of life questionnaires. *Quality of Life Research, 6*, 237-247.

Hinks, S., Tinkler, L., and Allin, P. (2013). Measuring subjective wellbeing and its potential role in policy: perspectives from the UK Office for National Statistics. *Social Indicators Research, 114*, 1, 73-86:http//doi.org/10.1007/s11205-013-0384-x

Hyland, M. E. (1992). A reformulation of quality of life for medical science. *Quality of Life Research, 1*, 267-272.

Kellert S. R. (2009). Biodiversity, quality of life and evolutionary psychology. In O. E. Sala, C. Parmesan, & L. Myers (Eds.). *Biodiversity Change and Human Health: From Ecosystem Services to Spread of Diseases* (pp. 99-128). Washington, D.C., USA: Island Press.

Keyes, C.L.M., Shmotkin, D., & Ryff, C.D. (2002). Optimising well-being: the empirical encounter of two traditions. *Journal of Personality and Social Psychology, 82*, 6, 1007-1022.

Kossakowski, J. J., Epskamp, S., Kieffer, J. M., van Borkulo, C. D., Rhemtulla, M., & Borsboom, D. (2016). The application of a network approach to Health-Related Quality of Life (HRQoL): introducing a new method for assessing HRQoL in healthy adults and cancer patients. *Quality of Life Research, 25*, 781–792.

Krägeloh,' C.U., Billington, D.R., Henning,' M.A., & Chai' P.P.M. (2015). Spiritual quality of life and spiritual coping: evidence for a two-factor structure of the WHOQOL spirituality,

religiousness, and personal beliefs module. *Health and Quality of Life Outcomes, 13*, 26-45. DoI: 10.1186/S 1255-015-0212x

Monod, S., Brennan, M., Rochat, E., Martin, E., Rochat, S., & Bula, C.J. (2011). Instruments measuring spirituality in clinical research: a systematic review. *Journal of General Internal Medicine, 26,* 11, 1354-1357.

O'Connell, K., & Skevington, S.M. (2010). Spiritual, religious and personal beliefs are important and distinctive when assessing quality of life in health: a comparison of theoretical models**.** *British Journal of Health Psychology, 15,* 4, 729-748. DoI 10.1348/135910709 x479799

Office of National Statistics (2011). *Measuring what Matters: National statistician's reflections on the national debate on measuring national well-being.* Newport, UK, Office of National Statistics.

Oishi, S. (2010). Culture and wellbeing: conceptual and methodological issues. In Eds E. Diener, J.F.Helliwell, & D. Kahneman, *International Differences in Well-being.* (pp 34-69), Oxford, UK, Oxford University Press.

Peasgood, T., Brazier, J.E., Mukuria, C., & Rowen, D. (2014). A conceptual comparison of well-being measures used in the UK. Project Report: 26. Policy Research Unit in Economic Evaluation of Health and Care Interventions (EEPRU), University of Sheffield, UK: http://eprints.whiterose.ac.uk/99497/

R Core Team. (2017). R: A language and environment for statistical computing (Version 3.4.2). Vienna: R Foundation for Statistical Computing. Abgerufen von http://www.R-project.org

588 Revelle, W. (2017). psych: Procedures for personality and psychological research (Version
589 1.7-8). Evanston, IL: Northwestern University. http://personality-
590 project.org/r/psych.manual.pdf

591 Ring, L., Hofer, S., McGee H., Hickey, A., & O'Boyle, C. (2006). Individual quality of life:
592 can it be accounted for by psychological or subjective well-being? *Royal College of*
593 *Surgeons in Ireland*, *82,* 3, 433-461.

594 Rubin, D.B. (1976). Inference and missing data. *Biometrika, 63,* 3, 581-592.

595 Ryff, C.D. (1989). Happiness is everything, or is it? Explorations on the meaning of
596 psychological well-being. *Journal of Personality and Social Psychology, 57,* 1069-1081.

597 Ryff, C.D., & Singer, B.H. (1998). The contours of positive human health. *Psychological*
598 *Inquiry, 9,* 1, 1-28.

599 Sclove, S.L. (1987). Application of model selection criteria to some problems in multivariate
600 analysis. *Psychometrika*, *52*, 3, 333-343.

601 Skevington SM (2002) Advancing cross-cultural research on quality of life: Observations
602 drawn from the WHOQOL development. *Quality of Life Research, 11*, 2, 135-144.

603 Skevington, S.M., & Epton, T. (2018). How will the sustainable development goals deliver
604 changes in wellbeing? A systematic review and meta-analysis to investigate whether
605 WHOQOL-BREF scores respond to change. *British Medical Journal Global Health,* Online
606 January 6th; Open access: e.000609. DoI:10.1136/bmjgh-2017-000609, Suppl 1.

607 Skevington, S.M., Gunson, K.S.E., & O'Connell, K.A. (2012). Introducing a short-form of
608 the WHOQOL SRPB: an international instrument for assessing quality of life in spiritual,
609 religious and personal beliefs. *Quality of Life Research, 22,* 5, 1073-1083.

Skevington, S.M., Sartorius, N., Amir, M. & the WHOQOL Group (2004). Developing methods for assessing quality of life in different cultural settings: the history of the WHOQOL instruments. *Social Psychiatry and Psychiatric Epidemiology, 39*, 1, 1-8. DoI: 10.1007/s00127-004-0700-5. PubMed PMID: 15022040.

State of Connecticut Department of Mental Health and Addiction Services (DMHAS) Consumer Survey (2014, December). *Annual Report* (pp. 63-72).

Stewart-Brown, S.L. (2015). Public mental health: an interdisciplinary subject? *British Journal of Psychiatry, 207*,192-194.

Stiglitz, J., Sen, A., & Fitoussi, J. (2009). *Report by the Commission on the measurement of economic performance and social progress.* Paris, Organisation for Economic Co-operation and Development (OECD). www.stiglitz-sen-fitoussi.fr/

Stochl, J., Böhnke, J. R., Pickett, K. E., & Croudace, T. J. (2016). An evaluation of computerized adaptive testing for general psychological distress: combining GHQ-12 and Affectometer-2 in an item bank for public mental health research. *BMC Medical Research Methodology, 16*, 58.

Theuns, P., Hofmans, J., Mazaheri, M., Van Acker, F., & Bernheim, J. L. (2010). Cross-national comparability of the WHOQOL-BREF: A measurement invariance approach. *Quality of Life Research, 19*, 219–224.

Triandis, H.C. (2000). Cultural syndromes and subjective well-being. In (Eds) E. Diener & E.M. Suh; *Culture and Subjective Well-being (*pp 13- 36), Massachusetts, USA, Massachusetts Institute of Technology.

631 Trompenaars, F.J., van Heck, G.L., Hodlament, P.P., & de Vries, J. (2007). The relationship
632 between dimensional personality models and quality of life in psychiatric outpatients.
633 *Psychiatry Research, 149*, 81-88.

634 Veenhoven, R. (2010). How universal is happiness? In E. Diener, J.F. Helliwell & D.
635 Kahneman (Eds.) *International Differences in Well-being*. (pp 328-350) Oxford, UK: Oxford
636 University Press.

637 Wagenmakers, E-J., & Farrell, S. (2004). AIC model selection using Akaike weights.
638 *Psychonomic Bulletin and Review*, *11*, 1, 192-196.

639 The World Health Organisation (WHO) (2015). *World Happiness Report 2015*. Geneva,
640 Switzerland, World Health Organisation http://worldhappiness.report/ed/2015/

641 The World Health Organisation Quality of Life Assessment Group. (WHOQOL)(1994). The
642 development of the WHO Quality of Life Assessment Instrument (The WHOQOL). In J
643 Orley and W. Kuyken (Eds.) *Quality of Life Assessment: International perspectives.* (pp 41-
644 60) Berlin, Heidelberg, and New York, Springer-Verlag.

645 The World Health Organisation Quality of Life Assessment Group (WHOQOL) (1998). The
646 World Health Organization Quality of Life Assessment (WHOQOL): development and
647 general psychometric properties. *Social Science & Medicine*, *46*, (12), 1569-1585.

648 The World Health Organisation Quality of Life Assessment Spirituality, Religion and
649 Personal Beliefs Group. (WHOQOL SRPB) (2006). A cross-cultural study of spirituality,
650 religion and personal beliefs as components of quality of life. *Social Science and Medicine,*
651 *62*, 2, 1486-1497.

652

653 **Table 1:** Conceptual framework of subjective quality of life for WHOQOL SRPB domains
654 and facets (adapted from The WHOQOL SRPB Group, 2006).

General Overall Quality of Life and Health

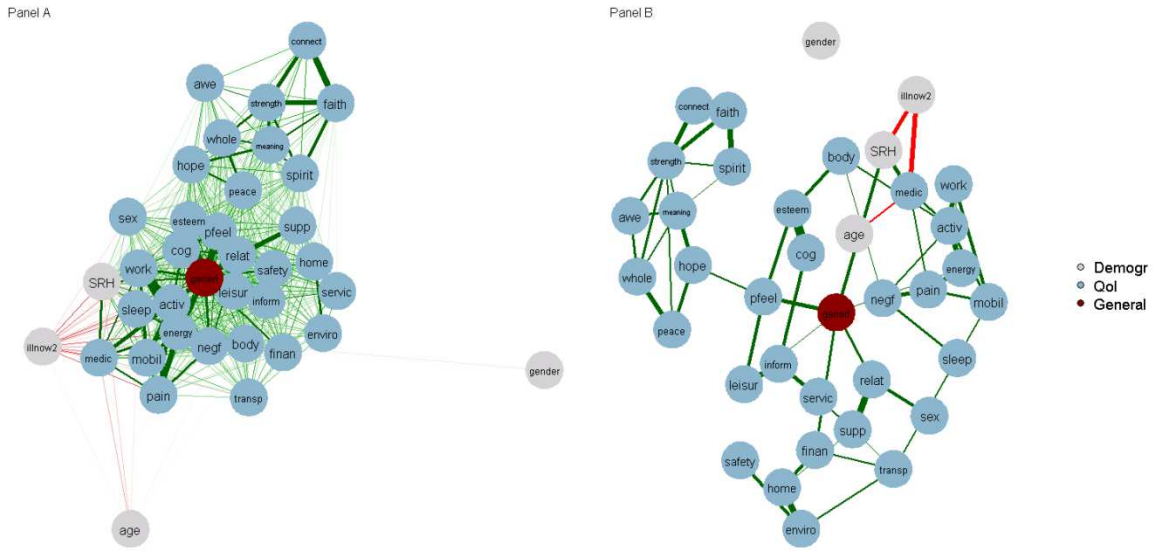
Physical Health	**Psychological**	**Independ-ence**	**Social Relationships**	**Environment**	**Spiritual, Religious & Personal Beliefs**
Pain & Discomfort	*Positive Feelings*	Mobility	Personal Relations	Physical Safety & Security	*Purpose in life***
Energy & Fatigue	Thinking, Learning, Memory & Concentration (Cognitions)	Activities of Daily Living	Practical Social Support	Home Environment	Spiritual Connection*
Sleep & Rest	Self-esteem	Dependence on Medication & Treatment	Sex-life	Financial Resources	*Meaning in Life**
	Body Image & Attractiveness	Working Capacity		Health & Social Care	Awe & Wonder*
	Negative Feelings			Information & Skills	Wholeness & Integration*
				Recreation & Leisure	Spiritual Strength*
				Physical Environment	Inner Peace*
				Transport	Hope &

Optimism*

Faith*

Key: *New SRPB facets; **formerly called ‘Spirituality’; *Italics* indicate SWB+ model components

658 **Figure 1**. Network plots presenting the correlational relationships between QoL and control
659 variables. Panel A shows the observed correlations and Panel B partial correlations (after
660 LASSO regularization); circles represent facets; red lines indicate negative and green lines
661 positive correlations; correlations $r < |.10|$ not shown; for abbreviations of facets see table 2



662

663

664 **Table 2:** Results of mixed-effect regression models predictinggeneral QoL and WB based on 20

665 imputed data sets (with abbreviations for facets in brackets, see figure 1)

	Model 1 only demographic	Model 2 demographic + SWB+	Model 3 demographic + QoL	Model 4 All
Gender	-.14	0.00	-.02	-.04
	(.10)	(0.08)	(.07)	(.07)
Marital status	.17	-0.05	-.13	-.14
	(.11)	(0.08)	(.08)	(.07)
Secondary education[b]	.19	-0.14	-.26*	-.27*
	(.16)	(0.12)	(.11)	(.11)
Univ./ Post-graduate[b]	.54**	0.04	-.25*	-.27*
	(.17)	(0.13)	(.11)	(.11)
Age-band (age)	.02***	0.008*	.002	.004
	(.004)	(0.003)	(.003)	(.003)
Currently ill? (illnow2)	-.53***	-0.39***	-.16*	-.16*
	(.11)	(0.09)	(.08)	(.08)
Health status rating (SRH)	1.64***	.83***	.53***	.49***
	(.07)	(0.05)	(.05)	(.05)
Pain & discomfort (pain)			-.004	.00
			(.01)	(.01)
Energy & fatigue (energy)			.11***	.10***
			(.02)	(.02)
Sleep & rest (sleep)			.03**	.03*
			(.01)	(.01)

Cognitions (cog)	-.01	-.02
	(.02)	(.02)
Self-esteem (esteem)	.13***	.09***
	.02	(.02)
Body Image	-.001	.003
& appearance (body)	(.01)	(.01)
Mobility (mobility)	.005	.003
	(.01)	(.01)
Activities of	.01	.01
daily living (activ)	(.02)	(.02)
Dependence on	.04**	.04***
medication/treatment	(.01)	(.01)
(medic)		
Working capacity	.02	.02
(work)		
	(.01)	(.01)
Personal relationships	.18***	.15***
(relat)		
	(.02)	(.02)
Practical social	.04*	.03*
Support (supp)	(.01)	(.01)
Sex-life (sexx)	.05***	.04***
	(.01)	(.01)
Physical safety &	.03*	.02
Security (safety)	(.02)	(.02)
Home environment	.06***	.05***
(home)		
	(.02)	(.02)
Financial resources	.11***	.11***
(finan)		

	(.01)	(.01)
Health & social care (servic)	.09***	.09***
	(.02)	(.02)
Information & skills (inform)	.01	.01
	(.02)	(.02)
Recreation & leisure (leisur)	.11***	.07***
	(.02)	(.02)
Physical environment (enviro)	-.02	-.02
	(.02)	(.02)
Transport (transp)	.01	.01
	(.01)	(.01)
Spiritual connection (connect)	.01	.01
	(.01)	(.01)
Awe & wonder (awe)	-.02	-.02
	(.01)	(.01)
Wholeness & Integration (whole)	.04* (.02)	.03* (.01)
Inner strength (strength)	-.01	-.02
	(.01)	(.01)
Inner peace (peace)	.04**	.03*
	(.01)	(.01)
Hope & optimism (hope)	.04*	.01
	(.01)	(.01)

Faith (faith)			.003	-.01
			(.01)	(.01)
Positive feelings (pfeel)		.43***		.18***
		(.02)		(.02)
Negative feelings (negf)		.19***		.02
		(.01)		(.01)
Purpose in life (‘Spirituality’) (spirit)		.05**		.01
		(.01)		(.01)
Meaning in life (meaning)		.07***		.03
		(.02)		(.02)
Constant	9.05***	1.96***	-2.21***	-2.16***
	(.39)	(.33)	(.36)	(.36)
SD(Constant)[a]	.73	.39	.37	.38
	(.16)	(.09)	(.09)	(.09)
SD(Residual)[a]	2.43	1.89	1.62	1.59
	(.03)	(.03)	(.02)	(.02)
R^2	.29	.59	.69	.70
AIC	11733	10470	9747	9648
BIC	11791	10551	9969	9893
Evidence weight (AIC/BIC)	--	0 / 0	0 / 0	1 / 1
LR-Test	--	$\chi^2_{Mod2\text{-}Mod1}$ = 1277.23 (df=4; p < .001)	$\chi^2_{Mod3\text{-}Mod1}$ = 2045.44 (df=28; p < .001)	$\chi^2_{Mod4\text{-}Mod2}$ = 873.50 (df=28; p < .001) $\chi^2_{Mod4\text{-}Mod3}$ = 105.29 (df=4; p < .001)

max(*VIF*)	2.39 (Education)	2.40 (Education)	3.43 (Activities)	3.51 (Activities)
max(MC error)	.01	.007	.006	.006

Note. *** p<0.001, ** p<0.01, * p<0.05; standard errors in parentheses; VIF variance inflation factor based on simple linear regressions; LR-Test Likelihood Ratio Test for model comparison; R^2, AIC, BIC, and VIF all based on randomly selected imputed data sets; [a]no asterisks provided since standard error based assessment of the relevance of variance components is not recommended; [b]Primary education as reference category

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Highlights

- How subjective wellbeing (SWB) relates to quality of life (QoL) is obscure.
- Cross-cultural WHOQOL SRPB data enabled a global evaluation of concepts.
- Network analysis corroborates the central importance of general QoL and SWB+.
- A QoL model with 13 facets explains more general variance than SWB+ alone.
- An integrated Life Quality and Wellbeing model and its measure are supported.