

**Personal Wellbeing Index –  
Adult**

**(PWI-A)**

**(Cantonese)**

**4<sup>th</sup> Edition**

**The International Wellbeing Group**

**MANUAL**

**2006**

**Citation of Reference for this Scale:**

International Wellbeing Group (2006). Personal Wellbeing Index- Adult (Cantonese). Australia: The Australian Centre on Quality of Life, Deakin University  
<http://www.deakin.edu.au/research/acqol/instruments/wellbeing-index.htm>

**For further information about this manual:**

Chinese Version

Anna L.D. Lau, Ph.D.  
School of Psychology  
Deakin University  
221 Burwood Highway  
Melbourne  
Victoria 3125  
AUSTRALIA

e-mail: [anna.lau@deakin.edu.au](mailto:anna.lau@deakin.edu.au)

English Version

Robert A. Cummins Ph.D., F.A.Ps.S.  
School of Psychology  
Deakin University  
221 Burwood Highway  
Melbourne  
Victoria 3125  
AUSTRALIA

e-mail: [robert.cummins@deakin.edu.au](mailto:robert.cummins@deakin.edu.au)

**Acknowledgment:** This manual was assembled on behalf of the International Wellbeing Group by Prof. Bob Cummins and Dr Anna Lau. We thank Ann-Marie James for her word processing and formatting assistance. We also acknowledge the support of Australian Unity (<http://www.australianunity.com.au/au>) as the industry partner which, in collaboration with Deakin University, has supported the development of this Index. In particular, we acknowledge the vital encouragement provided by the Australian Unity Board of Management and liaison staff as Derek MacMillan, Erik Okerstrom, Nic Messic, and Jacki van Vugt.

Published by *The Australian Centre on Quality of Life, Deakin University*

ISBN 1 74156 056 X

Date of Revision: 6 October 2010

# CONTENTS

<b>1. Introduction .....</b>	<b>5</b>
1.1 Defining and Measuring Quality of Life .....	5
1.2 Defining and Measuring Subjective Wellbeing.....	5
1.2.1 A Single-item .....	5
1.2.2 Multi-item scales .....	6
1.3 Issues and Principles in the Construction of Life Domain Measures .....	6
1.3.1 Choice of domains .....	6
1.3.2 Domain names and characteristics .....	6
1.4 Historical Development of the Personal Wellbeing Index .....	7
1.4.1 The International Wellbeing Group .....	7
1.4.2 Future development and an invitation.....	8
1.5 The Personal Wellbeing Index (PWI) Scale.....	9
1.5.1 Contents of the Scale.....	9
1.5.2 Psychometric overview .....	9
1.5.3 Construct validity .....	9
1.5.4 Convergent validity.....	9
1.5.5 Reliability.....	9
1.5.6 Sensitivity .....	10
1.6 Parallel Forms the PWI Scale.....	10
1.7 PWI Manuals and Translations .....	10
1.8 Publications using the Personal Wellbeing Index (November, 2006).....	11
<b>2. Scale Administration .....</b>	<b>12</b>
2.1 Guidelines.....	12
2.2 Specific Procedures: Use of 0-10 Likert Response Scale.....	12
2.3 The Test Items .....	13
2.3.1 The Personal Wellbeing Index Items .....	13
2.3.2 Additional Optional Item .....	13
2.4 Scoring.....	13
<b>3. Satisfaction with Life as a Whole and The PWI Scale (Verbal Format) .....</b>	<b>14</b>
3.1 Instructions for Verbal Format (i.e. respond to test items verbally).....	14
3.2 Test Items .....	14
<b>4. Satisfaction with Life as a Whole and The PWI Scale (Written Format) .....</b>	<b>15</b>
4.1 Instructions for Written Format (i.e. test items to be answered in written questionnaire) .....	15
4.2 Test Items .....	15
<b>5. Data Analysis and Interpretation.....</b>	<b>17</b>

5.1	Data Cleaning .....	17
5.2	Data Analysis of “Satisfaction with Life as a Whole” and Personal Wellbeing Index Scale Items. ....	17
5.3	Data Analysis converting raw scores into the standard 0 – 100 scale format .....	17
5.4	Data Interpretation.....	18
5.5	Normative Data .....	18
<b>6.</b>	<b>Reference List .....</b>	<b>19</b>
6.1	References to The Text.....	19
6.2	Publications using the Personal Wellbeing Index (November, 2006).....	20
6.3	Conference Papers using the Personal Wellbeing Index (June, 2005): Selected papers (Presented at IWBG-IWBI Sessions).....	22
<b>7.</b>	<b>Appendices .....</b>	<b>24</b>
	Appendix A The International Wellbeing Group Membership .....	24
	Appendix B Construct Validity – Australian Data .....	26
	Appendix C Construct Validity – Other Countries (Examples) .....	29
	Appendix D Mediation and Moderation.....	32
	Appendix E Normative Data from Report 16.0 of the Australian Unity Wellbeing Index .....	36

# 1. Introduction

---

## 1.1 Defining and Measuring Quality of Life

The quality of life (QOL) construct has a complex composition, so it is not surprising that there is neither an agreed definition nor a standard form of measurement. This is not due to a lack of ideas. The Directory of Instruments (<http://acqol.deakin.edu.au/instruments/instrument.php>), produced by the Australian Centre on Quality of Life, describes some 800 instruments which purport to measure life quality in some form, with each one containing an idiosyncratic mixture of dependent variables.

It is notable, however, that many of these instruments have been developed for highly selected groups in the population; particularly in regard to scales devised to monitor QOL in the context of medical conditions or disability. Such scales are unsuitable for use with the general population. Moreover, most scales devised for use with the general population cannot be used with all population sub-sets, such as people with cognitive impairment and children. These are important limitations since it means that the QOL experienced by minority groups cannot be norm-referenced back to the general population.

A further concern is that many QOL instruments fail to make a clear distinction between the objective and subjective dimensions of life quality. This violates the fundamental principle that objective and subjective dimensions are separate entities that normally bear little or no relationship to one another, and so must be separately measured.

With these issues in mind, the Personal Wellbeing Index has been developed to measure the subjective dimension of QOL – Subjective Wellbeing.

## 1.2 Defining and Measuring Subjective Wellbeing

It is generally agreed that subjective wellbeing (SWB) can be measured through questions of satisfaction directed to people's feelings about themselves. There are three ways in which these feelings can be tapped as follows:

### 1.2.1 A Single-item

People can be asked to rate their global life satisfaction. This normally takes the form:

“你對你整個人生, 總括呢講, 有幾滿意呢?”

“How satisfied are you with your life as a whole?”

Although this question is an excellent measure of SWB, such single-item format are less reliable than multi-item scales.

## 1.2.2 Multi-item scales

There are two approaches to this scale format:

(a) Single Construct scales

This approach combines multiple items, each of which taps to global life satisfaction. The individual items are not intended to have separate meaning within the SWB construct. Rather, they represent variations on the global satisfaction theme. This approach is exemplified by the Satisfaction with Life Scale (SWLS : Diener, Emmons, Larsen, & Griffin, 1985). This instrument comprises five items that, together, provide a measure of global SWB.

(b) Life Domain scales

This approach adopts a domain-level representation of global life satisfaction. Here, individual items refer to specific life domains (life aspects) and the scores are averaged to produce a measure of SWB. A large number of SWB instruments have adopted this approach and the Personal Wellbeing Index is one such instrument.

## 1.3 Issues and Principles in the Construction of Life Domain Measures

### 1.3.1 Choice of domains

A variety of techniques, such as factor analysis, may be employed to reduce the almost infinite number of putative domains to a manageable set. However, the Personal Wellbeing Index is unique in employing the theoretical principle of ‘deconstruction’ for this purpose. Using this principle, SWB is measured by the minimum set of domains which represent the first-level deconstruction of satisfaction with ‘Life as a Whole’.

### 1.3.2 Domain names and characteristics

No known theory can guide the initial selection of domain names. Thus, two further criteria have been employed to narrow the focus of the search to domain names most likely to result in a scale with the simplest conceptual construction.

- (a) Each domain name must describe a broad aspect of life which is amenable to both objective and subjective measurement. This is based on the fundamental principle that Quality of Life exists as separate objective and subjective dimensions. While the PWI is concerned only with the subjective dimension, this criterion allows the possibility that a parallel objective scale could be constructed. This criterion also excludes affective adjectives (e.g. Happiness).
- (b) Each domain must describe an unequivocal Indicator variable, as opposed to a Causal variable of QOL (for this distinction see Fayers, Hand, Bjordal, & Groenvold, 1997). An indicator variable may be defined as one that can never act alone as a mediator (for a description of the mediator-moderator distinction, see Baron & Kenny (1986) and the document by Mark Stokes in Appendix C). An example of an indicator variable is ‘Satisfaction with your Health’ and an example of a causal variable is ‘Satisfaction with your control over your life’. Because, the perception of control can mediate the influence of physical disability on health satisfaction, control is not an unequivocal Indicator variable. For a more detailed description of the Causal versus Indicator Variable distinction in relation to SWB and Health Related QOL see Cummins, Lau and Stokes (2004).

This approach to scale construction has a number of advantages:

- i. The end product is theoretically constrained and determined, hence, the scale items will form a single tight factor with high construct validity.
- ii. It is a parsimonious approach, which results in the minimal domain set necessary to fulfill the ‘first-level deconstruction’ criterion.
- iii. Due to the broad, semi-abstract nature of domains, the scale content is likely to have cross-cultural validity.

The application of this approach has led to the development of the Personal Wellbeing Index.

## **1.4 Historical Development of the Personal Wellbeing Index**

The Personal Wellbeing Index was created from the Comprehensive Quality of Life Scale (ComQol). (Cummins, McCabe, Romeo, & Gullone, 1994). The ComQol comprised both an objective and subjective measure of life quality and details of this test’s development have been published (Cummins, 1991; Cummins, McCabe, & Romeo, 1994; Gullone & Cummins, 1999; Marriage & Cummins, 2004). The ComQol domains were initially identified through a review of domain names used in the literature. This was subsequently followed by a three-phase process (Cummins et al., 1994) and empirical validation to generate the seven broad domains that comprised the scale (Cummins, 1997).

However, in 2001, the ComQol was abandoned due to two major flaws. One was that, despite repeated modification, the objective scale never factored into seven non-complex domains as intended. The other flaw was that domain importance and domain satisfaction were multiplied. A seminal article by Trauer and Mackinnon (2001) convincingly demonstrated that such multiplicative composites are psychometrically invalid. As a result, ComQol was abandoned. The detailed rationale for this action is available in Cummins (2002).

From the ashes of ComQol emerged the Personal Wellbeing Index. This scale retained only the questions on satisfaction and six of the seven domains. The original ComQol domain, ‘How satisfied are you with your own happiness?’, was replaced by ‘How satisfied are you with your future security?’. The ‘happiness’ domain was removed to fulfill the principle of PWI life-domain scale construction (see 1.3.2a), that any domain must be amenable to both objective and subjective measurement. The new domain title was proposed ad hoc by the inaugural meeting of the Australian Unity Steering Committee. Rather surprisingly, given its origin, the domain has proved to be psychometrically robust.

Another major difference between the PWI and ComQol is a change in the response scale format. This involved the replacement of the original 7-point Likert scale (consisting of adjectival descriptors) with an 11-point (0-10) End-Defined Response Scale (Jones & Thurstone, 1955). There were several reasons for this decision, the details of which have been described in Cummins and Gullone (2000). Of these, the most important issue is avoiding the psychometric confusion caused by applying adjectival descriptors to a numerically interval scale. Such descriptors are not separated by equal psychometric intervals and therefore provide misleading and redundant information. Additionally, the 11-point (0-10) choice is preferred as this optimizes respondent discriminative capacity and is simple to understand.

### **1.4.1 The International Wellbeing Group**

In 2002, Cummins and Lau initiated the International Wellbeing Group (IWbG) (Cummins & Lau, 2003). The major objective of the IWbG is to develop the PWI into a valid cross-cultural instrument. At this stage (2005), about 100 researchers from over 40 countries and provinces are engaged in this

international collaboration (See Appendix A). Members have a commitment to facilitate data collection using the PWI in their own countries, and to make these data available to the Group. Through this process, the PWI is expected to undergo controlled evolution as informed by empirical evidence. To date two changes to the PWI have been approved by the Group as follows:

1. A minor text change has been made to item 3 (life achievement domain) to ensure that the item pertains to the present. This change is as follows:

From PWI Version #1 (2002) : "...what you achieve in life'  
To current PWI Version #2 (2005): "...what you are achieving in life'.

The effect of this word change has been to significantly reduce the score for this domain (see Report 16.0). The average value over Survey 1 to Survey 10 is 74.47 (SD=0.45). The average value over Survey 11-Survey 16 is 72.75 (SD = 0.59). So the new wording has created an item that is still a highly reliable measure that has stabilised about 2 points below the original version. Its contribution to 'Life as a whole' in a multiple regression has not changed.

Such change has not been required in the Chinese translated PWI scale.

2. In November 2006 the Group agreed to add a new domain to the PWI. The wording of this new domain generated much discussion (see Group discussion on Spiritual/Religion domain: [http://www.deakin.edu.au/research/acqol/instruments/wellbeing\\_index.htm](http://www.deakin.edu.au/research/acqol/instruments/wellbeing_index.htm) ) and the version to be adopted, until such time as a superior form of words is demonstrated, is:

“你對自己嘅宗教或靈性方面的信仰有幾滿意呢？”

“How satisfied are you with your spirituality or religion?”

#### 1.4.2 Future development and an invitation

The IWbG, as a community of scholars, is engaged in the process of understanding SWB and the role that the Personal Wellbeing Index can play in its measurement. The Personal Wellbeing Index is not seen as a static device but rather as one which will evolve as new data and theory become available. Changes to the Index are determined by a simple majority vote of the membership.

Membership of the IWbG comprises three categories as:

*Primary Researchers:* Have a commitment to gather data using the PWI from their own country or province, and (if possible) to share those data with the Group.

*Discussants:* Scholars who advance the Group's purpose through their particular areas of expertise.

*Project Researchers:* Use the Personal Wellbeing Index for a particular research purpose and share their data with the Group.

The IWbG has a website at [http://www.deakin.edu.au/research/acqol/inter\\_wellbeing/index.htm](http://www.deakin.edu.au/research/acqol/inter_wellbeing/index.htm). A linked regional website on Hong Kong and China is available at [http://www.rs.polyu.edu.hk/IWBG\\_HK.htm](http://www.rs.polyu.edu.hk/IWBG_HK.htm)



## 1.5 The Personal Wellbeing Index (PWI) Scale

### 1.5.1 Contents of the Scale

The PWI scale contains seven items of satisfaction, each one corresponding to a quality of life domain as: standard of living, health, achieving in life, relationships, safety, community-connectedness, and future security. These seven domains are theoretically embedded, as representing the first level deconstruction of the global question:

“你對你整个人生，總括呢講，有幾滿意呢？”

(English) ‘How satisfied are you with your life as a whole?’.

### 1.5.2 Psychometric overview

The basic psychometric characteristics of the PWI in Australia have been described (Cummins, Eckersley, Pallant, Van Vugt, & Misajon, 2003). Cumulative psychometric characteristics of the scale are published in Cummins, R.A., Eckersley, R., Lo, S.K., Okerstrom, E., Hunter, B., & Davern, M. (2004). Detailed data concerning scale composition, reliability, validity, and sensitivity are provided in the many reports on the Australian Unity Wellbeing Index (<http://acqol.deakin.edu.au/index.htm>) and other countries (e.g. Lau, Cummins & McPherson, 2004; Tiliouine, Cummins & Davern, 2005). The following will list just some examples.

### 1.5.3 Construct validity

The eight domains constitute the minimum set of domains that represent the first level deconstruction of ‘Life as a whole’. This is verified, using the criterion that each domain must contribute unique variance when the domains are collectively regressed against ‘Satisfaction with life as a whole’ (see Appendix B and C). The combination of both unique and shared variance by the eight domains typically explains about 30-60 percent of the variance in ‘Satisfaction with Life as a Whole’. In relation to the identification of other potential domains, the following can be noted:

- i. The domain of ‘Safety’ never makes a unique contribution in Australia (see Appendix B) but is retained because it does so in other countries (Appendix C).
- ii. The new domain of ‘Spiritual or religion’ makes no unique contribution in Australia (Caras, 2003) but it has been shown to do so in Columbia.

The eight domains also consistently form a single stable factor and account for about 50% of the variance in Australia and other countries.

### 1.5.4 Convergent validity

A correlation of .78 with the Satisfaction with life scale (Diener, Emmons, Larsen, & Griffin, 1985) has been reported (Thomas, 2005).

### 1.5.5 Reliability

Sixteen surveys of the Australian population have produced a maximum variation of 3.2 percentage points in subjective wellbeing (see Australian Unity Wellbeing Index Report 16.0). Cronbach alpha lies between .70 and .85 in Australia and overseas. Inter-domain correlations are often moderate at round .30 to .55 and item-total correlations are at least .50. The index has also demonstrated good test-retest reliability across 1-2 week interval with an intra-class correlation coefficient of 0.84 (Lau and Cummins, 2005).

### 1.5.6 Sensitivity

The Reports on the Australian Unity Wellbeing Index, that incorporate the Personal Wellbeing Index, indicate a level of sensitivity between demographic groups that is consistent with the theory of subjective wellbeing homeostasis. This applies both in Australia (e.g. Cummins et al., 2005) and other countries (e.g. Lau et al., 2004; Tiliouine, Cummins & Davern, 2005).

### 1.6 Parallel Forms the PWI Scale

Parallel forms of the PWI have been created to allow an appropriate version of the scale to be used with all population sub-groups. These parallel forms are:

- PWI-A: designed for use with the general adult population, aged at least 18 years.  
PWI- SC: designed for use with school-age children and adolescents.  
PWI-PS: designed for use with pre-school age children.  
PWI-ID: designed for use with people who have an intellectual disability or other form of cognitive impairment.

### 1.7 PWI Manuals and Translations

Copies of these manuals, and their translated forms, are available from:  
[http://acqol.deakin.edu.au/instruments/wellbeing\\_index.htm](http://acqol.deakin.edu.au/instruments/wellbeing_index.htm)

The 'Chinese versions' are available at:  
[http://www.rs.polyu.edu.hk/IWBG\\_HK.htm](http://www.rs.polyu.edu.hk/IWBG_HK.htm)

#### Other translated versions on PWI-A : (E.G.)

- |                   |             |  |
|-------------------|-------------|--|
| Arabic            | :           | translated by Habit Tiliouine <htiliouine@yahoo.fr> (2002)           |
| Chinese           | - Cantonese | : translated by Anna Lau <rsalau@inet.polyu.edu.hk> (2002)           |
|                   | - Mandarin  | : translated by Xing Zhanjun <xingzhanjun@163.com> (2003)            |
|                   | - Tibetan   | : translated by Dave Webb <dwebb@ecel.uwa.edu.au> (2005)             |
| Croatian          | :           | translated by Ljiljana Lipovean <Ljiljana.Kaliterna@pilar.hr> (2003) |
| Dutch             | :           | translated by Joe Renty <Jo.Renty@UGent.be> (2002)                   |
| English<br>(2002) | :           | translated by Robert A Cummins <cummins@deakin.edu.au>               |
| Italian           | :           | translated by Annapia Verri <lunespo@tin.it> (2002)                  |
| Japanese          | :           | translated by Atsushi Naoi <naoi@hus.osaka-u.ac.jp> (2003)           |
| Mexican           | :           | translated by Mariano Rojas <mrojas@mail.udlap.mx> (2003)            |
| Norwegian         | :           | translated by Joar Vittersø <joarv@psyk.uit.no>                      |
| Persian           | :           | translated by Vahid Sari Sarraf <vsarisarraf@yahoo.com> (2005)       |
| Russian           | :           | translated by Ekaterina Uglanova <uglanovaea@mail.ru> (2005)         |
| Slovakia          | :           | translated by Jozef Dzuka <dzukaj@unipo.sk>(2002)                    |
| Spanish           | - Spain     | : translated by Ferran Casas <ferran.casas@pas.udg.es> (2002)        |
|                   | - Argentina | : translated by Graciela Tonon <edelvais@arnet.com.ar> (2002)        |

PWI-ID : Cummins, R.A. and Lau, A.L.D. (2005). *Personal Wellbeing Index – Intellectual Disability*. 3<sup>rd</sup> Edition.

Cummins, R.A. and Lau A.L.D. (2005). *Personal Wellbeing Index – Intellectual Disability*. 3<sup>rd</sup> Edition (Chinese-Cantonese).

PWI-SC : Cummins, R.A. and Lau, A.L.D. (2005). *Personal Wellbeing Index – School Children*. 3<sup>rd</sup> Edition.

Cummins, R.A. and Lau, A.L.D. (2005). *Personal Wellbeing Index – School Children*. 3<sup>rd</sup> Edition (Chinese-Cantonese).

PWI-PS : Cummins, R.A. and Lau, A.L.D. (2005). *Personal Wellbeing Index – Pre-School*. 3<sup>rd</sup> Edition.

Cummins, R.A. and Lau, A.L.D. (2005). *Personal Wellbeing Index – Pre-School*. 3<sup>rd</sup> Edition (Chinese-Cantonese).

## **1.8 Publications using the Personal Wellbeing Index (November, 2006)**

See Section 6.2 (Reference list)

## 2. Scale Administration

### 2.1 Guidelines

- (a) The PWI-A scale is to be administered with an adult who is at least 18 years of age.
- (b) The test items can be administered using either a verbal or written format.
- (c) The test items should be SELF-COMPLETED by the respondents themselves.
- (d) The test administrator should allow each respondent to respond in an entirely private manner, and assure respondents that their individual data will remain confidential and anonymous.
- (e) As the test items are designed to tap life domains which represent the first level deconstruction of life-as-a-whole, the test questions are broadly worded and intended to allow respondents to form their personal interpretation and judgment about them. If the respondent should seek conceptual clarification of these questions (e.g. ask for concrete explanations or examples) from the test administrator, it is important that the test administrator DOES NOT provide them. Rather, reply by re-directing the responsibility of interpreting these questions to the respondent. An example of such responses the test administrator may use is:

“只需跟你自己嘅理解來答呢條問題，答案無分啱或錯”

(Original English)

“Just think of the question you have been asked in the way it makes sense to you. There is no right or wrong answer.”

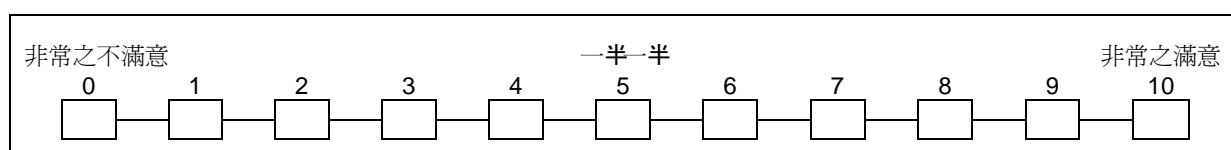
If the person remains unable to provide a response, skip to the next item or terminate.

- (f) It should be emphasized that there is NO time limit.

### 2.2 Specific Procedures: Use of 0-10 Likert Response Scale

If the Index is to be provided verbally, it is imperative that the respondent understands the nature of the task they are going to perform prior to administering the index. Thus, the administrator must take respondents verbally over the 11-point satisfaction scale (as shown below), indicating the two response anchors of ‘completely dissatisfied/completely satisfied’ and the neutral mid-position of ‘neutral’ (i.e. neither satisfied nor dissatisfied).

The test administrator should confirm that the required response mode is understood before proceeding with the index items.



Examples of standard instructions relevant to verbal and written administration formats of the test, are provided in the questionnaire shown in the next section of the manual (Section 3).

## 2.3 The Test Items

### 2.3.1 The Personal Wellbeing Index Items

These comprise eight questions of satisfaction with specific life domains. See following:

<u>Questions</u>	<u>Domains</u>
1. 你對你o既生活水平/指數有幾滿意呢？	[Standard of Living]
2. 你對你身體健康狀況有幾滿意呢？	[Personal Health]
3. 你對你o既個人成就，有幾滿意呢？	[Achieving in Life]
4. 你覺得你同其他人o既相處關係有幾滿意呢？	[Personal Relationships]
5. 你對自己o既個人安全感有幾滿意呢？	[Personal Safety]
6. 你覺得自己同社區o既融洽程度有幾滿意呢？	[Community-Connectedness]
7. 你對你將來o既人生保障有幾滿意呢？	[Future Security]
8. 你對你自己嘅宗教或靈性方面的信仰有幾滿意呢？	[Spirituality/Religion]

### 2.3.2 Additional Optional Item

“你對你整個人生o既個人際遇，總括呢講，有幾滿意呢？”

(Original English)

“Thinking about your own life and personal circumstances, how satisfied are you with your life as a whole?”

This item is NOT part of the PWI. However, it may be usefully added to the 7 core index items to test the construct validity of the PWI. This is achieved by regressing the index domains against ‘satisfaction with life as a whole’ to determine whether they each contribute unique variance. This procedure can also inform whether a new item should be considered as an additional domain.

This item is routinely included in surveys conducted in Australia (Australian Unity Wellbeing Surveys) and overseas (e.g. Hong Kong, Mainland China). If it is to be used, then it is recommended that this item be administered as the FIRST item, prior to the PWI items. This standardization procedure ensures that the Personal Wellbeing Index domains cannot influence this global response.

## 2.4 Scoring

Either:

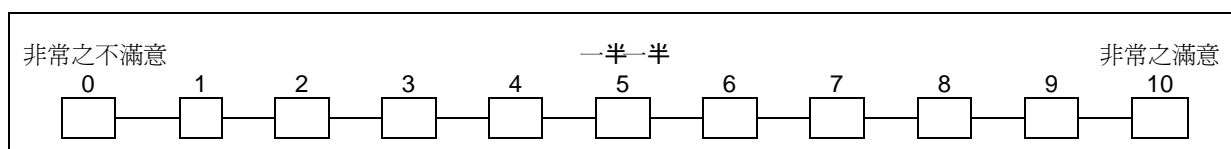
- Each of the eight domains (items) can be analysed as a separate variable, or
- The eight domain scores can be summed to yield an average score which represents ‘Subjective Wellbeing’.

# 3. Satisfaction with Life as a Whole and The PWI Scale (Verbal Format)

## 3.1 Instructions for Verbal Format (i.e. respond to test items verbally).

“跟住以下的問題是想了解一下你個人的滿意程度，你可以由零至十分選擇一個適合你的分數。

‘零’分代表你感覺得非常之不滿意，‘十’分代表你感覺得非常之滿意。如果你選擇‘五’分，就代表中立。”



“你需唔需要我重複講多一次俾你聽？”

( If required, repeat: "請選擇你對以下問題的滿意程度, 越高分代表越滿意, 越低分代表越唔滿意。 )

“如果無問題，我而家就開始問你有關你對生活上一些事情上的滿意程度。”

## 3.2 Test Items

### Part I (Optional item): Satisfaction with Life as a Whole

你對你整個人生既個人際遇，總括呢講，有幾滿意呢？

Respondent's Rating  
(0-10)

### Part II: Personal Wellbeing Index

1. 你對你既生活水平/指數有幾滿意呢？你會俾幾多分呢？

2. 你對你身體健康狀況有幾滿意呢？你會俾幾多分呢？

3. 你對你既個人成就，有幾滿意呢？你會俾幾多分呢？

4. 你覺得你同其他人相處關係有幾滿意呢？你會俾幾多分呢？

5. 你對自己個人安全感有幾滿意呢？你會俾幾多分呢？

6. 你覺得自己同社區融洽程度有幾滿意呢？你會俾幾多分呢？

7. 你對你將來人生保障有幾滿意呢？你會俾幾多分呢？

8. 你對你自己嘅宗教或靈性方面的信仰有幾滿意呢？你會俾幾多分呢？

## 4. Satisfaction with Life as a Whole and The PWI Scale (Written Format)

### 4.1 Instructions for Written Format (i.e. test items to be answered in written questionnaire)

“跟住以下的問題是想了解一下你個人的滿意程度. 你可以由零至十分選擇一個適合你的分數。‘零’分代表你感覺得非常之不滿意, ‘十’分代表你感覺得非常之滿意。如果你選擇‘五’分, 就代表中立。”

### 4.2 Test Items

#### Part 1

1. 你對你整個人生既個人際遇, 總括呢講, 有幾滿意呢? 你會俾幾多分呢?

非常之不滿意					一半一半						非常之滿意
0	1	2	3	4	5	6	7	8	9	10	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

#### Part 2

1. 你對你既生活水平/指數有幾滿意呢? 你會俾幾多分呢?

非常之不滿意					一半一半						非常之滿意
0	1	2	3	4	5	6	7	8	9	10	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. 你對你身體健康狀況有幾滿意呢? 你會俾幾多分呢?

非常之不滿意					一半一半						非常之滿意
0	1	2	3	4	5	6	7	8	9	10	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. Satisfaction with Life as a Whole and the PWI Scale (Written Format) Continued

3. 你對你o既個人成就，有幾滿意呢？你會俾幾多分呢？

非常之不滿意 0 1 2 3 4 5 6 7 8 9 10 非常之滿意

一半一半

A horizontal scale from 0 to 10. Each number is above a small square box. The boxes are connected by horizontal lines. Above the number 0 is the text '非常之不滿意'. Above the number 10 is the text '非常之滿意'. Above the number 5 is the text '一半一半'.

4. 你覺得你同其他人o既相處關係有幾滿意呢？你會俾幾多分呢？

非常之不滿意 0 1 2 3 4 5 6 7 8 9 10 非常之滿意

一半一半

A horizontal scale from 0 to 10. Each number is above a small square box. The boxes are connected by horizontal lines. Above the number 0 is the text '非常之不滿意'. Above the number 10 is the text '非常之滿意'. Above the number 5 is the text '一半一半'.

5. 你對自己o既個人安全感有幾滿意呢？你會俾幾多分呢？

非常之不滿意 0 1 2 3 4 5 6 7 8 9 10 非常之滿意

一半一半

A horizontal scale from 0 to 10. Each number is above a small square box. The boxes are connected by horizontal lines. Above the number 0 is the text '非常之不滿意'. Above the number 10 is the text '非常之滿意'. Above the number 5 is the text '一半一半'.

6. 你覺得自己同社區o既融洽程度有幾滿意呢？你會俾幾多分呢？

非常之不滿意 0 1 2 3 4 5 6 7 8 9 10 非常之滿意

一半一半

A horizontal scale from 0 to 10. Each number is above a small square box. The boxes are connected by horizontal lines. Above the number 0 is the text '非常之不滿意'. Above the number 10 is the text '非常之滿意'. Above the number 5 is the text '一半一半'.

7. 你對你將來o既人生保障有幾滿意呢？你會俾幾多分呢？

非常之不滿意 0 1 2 3 4 5 6 7 8 9 10 非常之滿意

一半一半

A horizontal scale from 0 to 10. Each number is above a small square box. The boxes are connected by horizontal lines. Above the number 0 is the text '非常之不滿意'. Above the number 10 is the text '非常之滿意'. Above the number 5 is the text '一半一半'.

8. 你對你自己嘅宗教或靈性方面的信仰有幾滿意呢？你會俾幾多分呢？

非常之不滿意 0 1 2 3 4 5 6 7 8 9 10 非常之滿意

一半一半

A horizontal scale from 0 to 10. Each number is above a small square box. The boxes are connected by horizontal lines. Above the number 0 is the text '非常之不滿意'. Above the number 10 is the text '非常之滿意'. Above the number 5 is the text '一半一半'.



# Data Analysis and Interpretation

---

## 4.2 Data Cleaning

It is essential that all data are checked for response sets. These are evident when the respondent scores at the top or the bottom of the scale for all eight Personal Wellbeing Index items. Such data may indicate a response set due to either acquiescence or a lack of understanding. No matter the cause, the lack of variation will distort the data analysis. Hence, data sets from individual respondents showing consistently maximum or minimum scores on all 8 domains should be eliminated prior to data analysis.

## 4.3 Data Analysis of “Satisfaction with Life as a Whole” and Personal Wellbeing Index Scale Items.

Standardize all data into units of a 0 to 100 point distribution. This is achieved by shifting the decimal point one step to the right. E.g. a value of 6.0 becomes 60 points.

## 4.4 Data Analysis converting raw scores into the standard 0 – 100 scale format

Mark Stokes and Bob Cummins  
School of Psychology, Deakin University

For the purpose of creating results that can be simply compared with one another, we convert all data to a standard form, which makes it look as though they had all been rated on a 0 – 100 point scale. The values derived from this process are called ‘percentage of scale maximum’ (%SM). This conversion does not alter the statistical properties of the data, since the process is a simple linear conversion, but it has the advantage that data from the PWI and other scales can be directly compared in terms of their means and standard deviations.

The conversion of PWI scores, which have been derived from a 0 – 10 response scale, is simple. The conversion is achieved by simply shifting the decimal point to the right. For example, a score of 7 becomes 70 %SM, or a mean score of 6.56 becomes 65.6%SM.

When comparisons are to be made with other data that have been derived from different response scales, such as ones that use a 1 – 5 rating, then the values derived from the scale can be converted to the standard 0 – 100 %SM through the use of the formula below.

$$\frac{X - k^{\min}}{k^{\max} - k^{\min}} \times 100$$

X = the score or mean to be converted

$k^{\min}$  = the minimum score possible on the scale  
ie If a scale is score from 1 to 5, then  $k^{\min} = 1$   
If a scale is score from -5 to +5, then  $k^{\min} = -5$

$k^{\max}$  = the maximum score possible on the scale  
ie If a scale is score from 1 to 5, then  $k^{\max} = 5$   
If a scale is score from -5 to +5, then  $k^{\max} = +5$

### Example 1

A mean score of 3.5 on a scale rated from 1 to 5.

$$\frac{3.5 - 1}{5 - 1} \times 100 = 62.5\%SM$$

### Example 2

A mean score of +3.5 on a scale rated from -5 to +5.

$$\frac{+3.5 - (-5)}{+5 - (-5)} \times 100 = \frac{+8.5}{+10} \times 100 = 85.0\%SM$$

## 4.5 Data Interpretation

Data derived on the Personal Wellbeing Index scale items may be used either at the level of individual domains, or the domain scores may be aggregated and averaged to form the Personal Wellbeing Index (PWI).

The item “Happiness with Life as a Whole” **IS NOT** a component of the PWI and hence, should be analysed as a separate variable. This item is used to test the construct validity of the PWI using multiple regression. Each domain should contribute unique variance and the normative data using this technique are shown in Appendix B and C.

The mean of the domain scores derived from the PWI constitutes a measure of Subjective Wellbeing. Such a datum can be referenced to two types of normative data as follows:

- (a) If the datum is the score of an individual person, it can be referenced to the normal distribution of individuals within a population. The Australian normative range for individuals is 50-100 points.
- (b) If the datum is the mean score of a group, it can be referenced to the normal distribution of group means. The normative range for Western means is 70-80 points. The normative range for Australia is 73.4 – 76.4 points.

Note: These values are generally ‘around 10 percentage points lower for Asian populations’ due to a cultural response bias e.g. Chinese (Lau, Cummins & McPherson, 2005).

## 4.6 Normative Data

### Normative Australian data

[http://www.deakin.edu.au/research/acqol/instruments/wellbeing\\_index.htm](http://www.deakin.edu.au/research/acqol/instruments/wellbeing_index.htm)

### International Normative and Comparative data

[http://www.deakin.edu.au/research/acqol/instruments/wellbeing\\_index.htm](http://www.deakin.edu.au/research/acqol/instruments/wellbeing_index.htm)

# 5. Reference List

---

## 5.1 References to The Text

- Baron, R.M., & Kenny, D.A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*, 1173-1182.
- Caras, C. (2003). Religiosity/Spirituality, and Subjective Wellbeing. Thesis, Melbourne, Deakin University.
- Cummins, R.A. (2002). Vale ComQol: Caveats to using the Comprehensive Quality of Life Scale: Welcome the Personal Wellbeing Index. Melbourne: Deakin University  
[http://acqol.deakin.edu.au/instruments/Caveats\\_ComQol\\_scales.doc](http://acqol.deakin.edu.au/instruments/Caveats_ComQol_scales.doc)
- Cummins, R.A., Eckersley, R., Lo, S.K., Okerstrom, E., Hunter, B., & Davern, M. (2004). *Australian Unity Wellbeing Index: Cumulative Psychometric Record*. Melbourne: Australian Centre on Quality of Life, School of Psychology, Deakin University.  
[http://acqol.deakin.edu.au/index\\_wellbeing/index.htm](http://acqol.deakin.edu.au/index_wellbeing/index.htm)
- Cummins, R.A. & Gullone, E. (2000). Why we should not use 5-point Likert scales: The case for subjective quality of life measurement. *Proceedings, Second International Conference on Quality of Life in Cities* (pp. 74-93). Singapore: National University of Singapore.  
[http://acqol.deakin.edu.au/instruments/PWI/2000-QOL\\_in\\_Cities-Likert\\_Scales-ss.doc](http://acqol.deakin.edu.au/instruments/PWI/2000-QOL_in_Cities-Likert_Scales-ss.doc)
- Cummins, R.A., Eckersley, R. Pallant, J. Van Vugt, J, & Misajon, R. (2003). Developing a national index of subjective wellbeing: The Australian Unity Wellbeing Index. *Social Indicators Research*, *64*, 159-190.
- Cummins, R.A., & Lau, A.L.D. (2003). *An introduction to the International Wellbeing Group and the International Wellbeing Index*. Fifth Conference of the International Society for Quality-of-Life Studies, Frankfurt, Germany, July.
- Cummins, R.A. & Lau, A.L.D. (2004). *Personal Wellbeing Index – Intellectual Disability: Second Edition*. Melbourne: Australian Centre on Quality of Life, Deakin University.  
[http://acqol.deakin.edu.au/instruments/wellbeing\\_index.htm](http://acqol.deakin.edu.au/instruments/wellbeing_index.htm)
- Cummins, R.A. (1991). The Comprehensive Quality of Life Scale – Intellectual Disability: An initial report. *Australian and New Zealand Journal of Developmental Disabilities*, *17*, 259-264.
- Cummins, R.A. (1996). The domains of life satisfaction: An attempt to order chaos. *Social Indicators Research*, *38*, 303-332.
- Cummins, R.A. (1997). *Comprehensive Quality of Life Scale - Adult*, Manual: Fifth Edition. Melbourne: School of Psychology, Deakin University, (pp. 1-51). (ISBN 0 7300 2804 6)  
[http://acqol.deakin.edu.au/instruments/ComQol\\_A5.pdf](http://acqol.deakin.edu.au/instruments/ComQol_A5.pdf)
- Cummins, R.A., Lau, A.L.D. & Stokes, M. (2004). HRQOL and subjective wellbeing: non-complementary forms of outcome measurement. *Expert Reviews in Pharmacoeconomics Outcomes Research*, *4*, 413-420.
- Cummins, R.A., McCabe, M.P., & Romeo, Y. (1994). *The Comprehensive Quality of Life Scale – Intellectual Disability: Results from a Victorian Survey*. Paper presented at the 29<sup>th</sup> National Conference of the Australian Society for the Study of Intellectual Disability.
- Cummins, R.A., McCabe, M.P., Romeo, Y., & Gullone, E. (1994). The Comprehensive Quality of Life Scale: Instrument development and psychometric evaluation on tertiary staff and students. *Educational and Psychological Measurement*, *54*, 372-382.

- Diener, E.D., Emmons, R.A., Larsen, R.J., & Griffin, S. (1985). The Satisfaction with Life Scale. *Journal of Personality Assessment*, 49, 71-75.
- Fayers, P.M., Hand, D.J., Bjordal, K., & Groenvold, M. (1997). Causal indicators in quality of life research. *Quality of Life Research*, 6, 393-406
- Gullone, E., & Cummins, R.A. (1999). The Comprehensive Quality of Life Scale: A psychometric evaluation with an adolescent sample. *Behaviour Change*, 16, 127-139.
- Jones, L.V., & Thurstone, L.L. (1955). The psychophysics of semantics: An experimental investigation. *The Journal of Applied Psychology*, 39(1), 31-36.
- Lau, A.L.D., & Cummins, R.A. (2005). Test-retest Reliability of the Personal Wellbeing Index. Unpublished research report, The Hong Kong Polytechnic University.
- Lau, A.L.D., Cummins, R.A., and McPherson, W. (2005) An Investigation into the Cross-Cultural Equivalence of the Personal Wellbeing Index. *Social Indicators Research*, 72, 403-432.
- Marriage, K., & Cummins, R.A. (2004). Subjective quality of life and self-esteem in children: The role of primary and secondary control in coping with everyday stress. *Social Indicators Research*, 66, 107-122.
- Thomas, J. (2005). Satyananda yogic lifestyle and subjective wellbeing (paper in preparation). johnthomas7@bigpond.com.
- Tiliouine, H., Cummins, R. A. and Davern, M. (2005) Measuring Wellbeing in Developing Countries: The Case of Algeria. *Social Indicators Research*, (in press).
- Trauer, T and Mackinnon, A. (2001). Why are we Weighting? The Role of Importance Ratings in Quality of Life Measurement. *Quality of Life Research*, 10, 577-583.

## 5.2 Publications using the Personal Wellbeing Index (November, 2006)

- Amarach, (2003). *Quality of life in Ireland revisited*. Diageo, Ireland.  
Contact: Gerard O'Neill <[gerard.oneill@amarach.com](mailto:gerard.oneill@amarach.com)>
- Boazman, J. (2005)  
Thesis: The well-being of gifted students who have been accelerated into a university setting.  
Contact: Janette Boazman <[boazmanfamily@sbcglobal.net](mailto:boazmanfamily@sbcglobal.net)>
- Casas, F., Coenders, G., Cummins, R. A., González, M., Figuer, C., & Malo, S. (2006). Does overall life satisfaction and satisfaction with life domains show any relationship between parents and children? (Journal of Happiness Studies ,In press)  
Contact: Ferran Casas <[ferran.casas@pas.udg.es](mailto:ferran.casas@pas.udg.es)>
- Cummins, R. A., Eckersley, R., Okerstrom, E., Lo, S.K., Davern, M., Hunter, B., & Woerner, J. (2005). *The Australian Unity Wellbeing Index: 2004 Update*. Australian Centre on Quality of Life, Deakin University.  
[http://www.deakin.edu.au/research/acqol/Conferences/abstracts\\_papers/2004/Cummins\\_AWI\\_update.ppt#1](http://www.deakin.edu.au/research/acqol/Conferences/abstracts_papers/2004/Cummins_AWI_update.ppt#1)
- Cummins, R. A., Eckersley, R. Pallant, J. Van Vugt, J., & Misajon, R. (2003). Developing a national index of subjective wellbeing: The Australian Unity Wellbeing Index. *Social Indicators Research*, 64, 159-190.  
Contact: Bob Cummins <[cummins@deakin.edu.au](mailto:cummins@deakin.edu.au)>

- Cummins, R. A., Hunter, B., Davern, M., Eckersley, R., Lo, S. K., & Okerstrom., E (2003). The Australian Unity Wellbeing Index: An Overview. *Social Indicators Network News*, 76, 1-4.  
Contact: Bob Cummins <cummins@deakin.edu.au>
- Davern, M. and Cummins, R. A. (2005). Is life dissatisfaction the opposite of life satisfaction? *Australian Journal of Psychology*, 58, 1-7.  
Contact: Melanie Davern <mdavern@unimelb.edu.au>
- Davern, M. & Cummins, R. A. (2006). Subjective wellbeing as an affective-cognitive construct. (submitted)  
Contact: Melanie Davern <mdavern@unimelb.edu.au>
- Ganglmair-Wooliscroft, A and Lawson, R (2006), Applying the International Wellbeing Index in New Zealand: Preliminary Results. *31st Annual Macromarketing Seminar*, eds. Roger Latin, Merrilyn Layton, Ben Wooliscroft, Queenstown, New Zealand, p. 349-368.  
Contact: Alexandra Ganglmair <AGanglmair@business.otago.ac.nz>
- Lau, A. L. D., Cummins, R. A. & McPherson, W. (2005). An Investigation into the Cross-Cultural Equivalence of the Personal Wellbeing Index, *Social Indicators Research*, 72, 403-430.  
Contact: Anna Lau <[rsalau@inet.polyu.edu.hk](mailto:rsalau@inet.polyu.edu.hk)>
- Lau, A., Chi, I., Cummins, R.A., Lee, T.M.C., Chou, K.L., & Chung, L.W.M. (in preparation). Severe Acute Respiratory Syndrome (SARS) Outbreak and the Subjective Wellbeing of Hong Kong Older Adults.  
Contact: Anna Lau <[rsalau@inet.polyu.edu.hk](mailto:rsalau@inet.polyu.edu.hk)>
- Lau, A.L.D., & Cummins, R.A. (2005). Test-retest Reliability of the Personal Wellbeing Index. Unpublished research report, The Hong Kong Polytechnic University  
Contact: Anna Lau <[rsalau@inet.polyu.edu.hk](mailto:rsalau@inet.polyu.edu.hk)>
- Liqing, H., & Zhanjun, X. (2005). An Initial Research on Wellbeing Index Applied to Citizens in China. *Chinese Journal of Behavioral Medical Science*, 14, 464- 465. [in Mandarin]  
Contact: Xing Zhanjun <[xingzhanjun@163.com](mailto:xingzhanjun@163.com)>
- Mellor, D.J., Cummins, R.A., & Loquet, T. (in preparation). Life quality and wealth: A qualitative and quantitative comparison of affluent and poor people.  
Contact: David Mellor <[mellor@deakin.edu.au](mailto:mellor@deakin.edu.au)>
- Moller, V. (2005). Resilient or Resigned? Criminal Victimization and Quality of Life in South Africa. *Social Indicators Research*, 72, 263 – 317.  
Contact: Valerie Moller <[v.moller@ru.ac.za](mailto:v.moller@ru.ac.za)>
- Thomas, J. (2005). Satyananda Yogic Lifestyle and Subjective Wellbeing. (Submitted)  
Contact: John Thomas <[dharmadeva@satyananda.net](mailto:dharmadeva@satyananda.net)>
- Tiliouine, H., Cummins, R. A., & Davern, M. (2006). Measuring Wellbeing in Developing Countries: The Case of Algeria. *Social Indicators Research*, 75, 1-30.  
Contact: Habib Tiliouine <[hiliouine@yahoo.fr](mailto:hiliouine@yahoo.fr)>
- Tiliouine, H., Cummins, R.A. & Davern, M. (in preparation). Islamic religiosity and personal wellbeing in Algeria.  
Contact: Habib Tiliouine <[hiliouine@yahoo.fr](mailto:hiliouine@yahoo.fr)>

### 5.3 Conference Papers using the Personal Wellbeing Index (June, 2005): Selected papers (Presented at IWBG-IWBI Sessions)

Fifth Conference of The International Society for Quality of Life Studies, Frankfurt, Germany, July 2003.

- Casas, F. <ferran.casas@pas.udg.es> (2003). *Results from the International Wellbeing Index in a Spanish City.*
- Cummins, R.A., & Dzuka, J., & Arita, B. (2003). A Comparison of the Personal Wellbeing Index in Slovakia, Mexico, and Australia.
- Cummins, R.A. <cummins@deakin.edu.au>, & Lau, A.L.D. (2003). *An introduction to the International Wellbeing Group and the International Wellbeing Index.*
- Davern, M. <mtda@deakin.edu.au>, Cummins, R.A., Eckersley, R., & Okerstrom, E. (2003). *Australian Unity Wellbeing Index and the Importance of Personal relationships and Household Structure on the Wellbeing of Australians*
- Hunter, B. <bhu@mail.deakin.edu.au>, Osborne, J., & Cummins, R.A. (2003). *The Usefulness of Including Measures of National Wellbeing in Surveys of Population Subjective Wellbeing.*
- Lau, A.L.D. <rsalau@inet.polyu.edu.hk> & Cummins, R.A. (2003). *Validation of the International Wellbeing Index in Hong Kong.*
- Lau, A.L.D., & Cummins, R.A. (2003). *The Subjective Wellbeing of Asian Chinese and Western Populations: A Cross-Cultural Perspective.*
- Tonon, G. <edelvais@arnet.com.ar>, Aguirre, V., & De la Vega, L.R. (2003). *Quality of Life in Argentina in the Economic, Politic and Social Crisis. Pilot Test: International Wellbeing Index.*
- Verri, A. <annapia.verri@mondino.it>, Nosetti, L., Scaravaggi, S., Ramponi, A., Kaltcheva, D., & Nespoli, L. (2003). *Quality of Life in Families of ALTE (Apparent Life Threatening Event) Children.*
- Vuletic, G. <Gorka.Vuletic@snz.hr> (2003). *Subjective Quality of Life and Self Assessed Social Support among Croatian Immigrants in Australia: A Comparison with Non-Migrant Croatians and Australians.*

Sixth Conference of The International Society for Quality of Life Studies, Philadelphia, US, November 2004.

- Cummins, R.A. (2004). *The International Well-Being Index: A Psychometric Progress Report.*
- Lau, A.L.D., Cummins, R.A., & Yeung, P.H. (2004). *A Cross-Cultural Investigation into 'Happiness' and 'Satisfaction'.*
- Lau, A.L.D., Chi, I., Cummins, R.A., Lee, T.M.C., Chou, K.L., & Chung, L.W.M. (2004). *Severe Acute Respiratory Syndrome (SARS) and Subjective Wellbeing (SWB).*
- Moller, V. <v.moller@ru.ac.za> (2004). *Concern for Safety and the Personal Wellbeing Index.*
- Watanabe, B.Y.A. <baritaw@hotmail.com> (2004). *Capacity and Subjective Well-Being as Dimensions for Study of Quality of Life in Mexico.*
- Baltatescu, S. <bsergiu@uoradea.ro > (2004). *Subjective Well-Being in a Post-Communist Country: Romania's International Well-Being Index.*
- Davern, M. (2004). *An Investigation of Affect, Cognition and Personality in Subjective Well-Being.*
- Tiliouine, H. <htiliouine@yahoo.fr> (2004). *Well-being in Developing Countries: The Case of Algeria.*
- Tonon, G. (2004). *The Well-Being Index Two Years After the National Crisis in Argentina.*

Guerrero, L.L. <guerrero@sws.org.ph> (2004). *The Philippine Score on the International Well-Being Index*.

Verri, A., Ramponi, A., Scaravaggi, S., Nespoli, M.F., Davern, M., & Cummins, R. A. (2004). *International Well-Being Index and Italian Students: A Preliminary Study*.

Seventh Conference of The International Society for Quality of Life Studies, Grahamstown, South Africa, July 2006.

Cummins, R.A., & Lau, A.L.D. *The Personal Wellbeing Index as one of four theoretically linked measures of subjective wellbeing*

Lau, A.L.D., Cummins, R.A., Lam, P.K.W., Li, E.P.Y., McGillivray, J., Chan, C.C.H. *A modified version of the Personal Wellbeing Index for measuring subjective wellbeing of people with cognitive impairment*

Webb, D. *Assessing personal wellbeing in remote Tibetan communities*

Baltatescu, S., & Cummins, R.A. *Using the Personal Wellbeing Index to explore subjective wellbeing of high-school and college students in Romania.*

Tilouine, H. *Stability and change in the Algerian population's wellbeing*

Bouzid, N., & Tiliouine, H. *Comparing wellbeing in the East and the West of Algeria*

Tonon, G., Aguilera, De Los Angeles Auilera, M., & De la Vega, L.R. *Young people quality of life in Buenos Aires conurban (2004-2005)*

Bear, R. *Individual subjective wellbeing maintenance: Does complete adaptation to challenging life events occur over time?*

Tomyn, A.J., & Cummins, R.A. *Subjective well-being as an affective construct? Theory validation and construction with an adolescent sample*

# 6. Appendices

---

## Appendix A

### The International Wellbeing Group Membership

(November 2006)

International Wellbeing Group Website:

[http://www.deakin.edu.au/research/acqol/inter\\_wellbeing/index.htm](http://www.deakin.edu.au/research/acqol/inter_wellbeing/index.htm)

Linked Regional Site for Hong Kong and China:

[http://www.rs.polyu.edu.hk/IWBG\\_HK.htm](http://www.rs.polyu.edu.hk/IWBG_HK.htm)

<b>Country</b>	<b>Primary Researcher</b>	<b>Country</b>	<b>Primary Researcher</b>
Algeria	Professor Habib Tiliouine	Latin America	Dr Carol Graham
Argentina	Professor Graciela Tonon	Lebanon	Assoc Prof Huda Abdo
Australia	Professor Robert A. Cummins	Laos	Assoc Prof Liz Eckermann
Belgium	Professor Jan L. Bernheim	Malaysia	Prof. Dr. Rosna A. Hashim
Canada	Professor Alex C. Michalos	Mauritius	Dr Prakash (Sanju) Deenapanray Anneloes Smitsman
China	Dr Anna Lau (HK & China coordinator)	Mexico	Dr Mariano Rojas
(Hong Kong)	Dr Anna Lau	Netherlands	Dr Anna Nieboer
(Guangzhou)	Gareth Davey	New Zealand	Dr Alexandra Ganglmair-Wooliscroft
(Macau)	Assoc Prof Bing-Shu Cheng	Norway	Professor Joar Vitterso
(Qinghai province, Yushu prefecture)	Dr Dave Webb	Pakistan	Professor Kausar Suhail
(Shandong Province)	Dr Xing Zhanjun	Philippines	Dr Mahar Mangahas Dr Linda Luz Guerrero
Columbia	Assoc Prof Eduardo Wills Herrera	Poland	Dr Aleksandra Zawislak
Croatia	Dr Ljiljana Kaliterna Lipovean	Portugal	Professor Félix Neto
England	Dr Paul Anand	Romania	Sergiu Baltatescu
Finland	Professor Sakari Suominen	Russia	Dr. Ekaterina Uglanova
Germany	Professor Elisabeth Wacker	Rwanda	Dr Alex Hakuzimana
Greenland	Dr Birger Poppel	Singapore	Dr Lim Lan Yuan
Hungary	Professor Anna Vari	Slovakia	Dr Jozef Dzuka Dr Viera Bac
India	Yashwant Deshmukh	South Africa	Professor Valerie Moller
Iran	Vahid Sari Sarraf	Spain	Professor Ferran Casas
Ireland	Dr. Stefan Hoefel Gerard O'Neill	Switzerland	Mike Anson
Israel	Professor Sara Carmel	Taiwan	Professor Meng-Wen Tsou Professor Jin-Tan Liu
Italy	Dr Annapia Verri	Thailand	Professor Pramote Supppanya
Japan	Professor Atsushi Naoi	Turkey	Assoc Prof Candan Ozturk
		USA	Professor Ed Diener
		West Indies	Dr Gerard Hutchinson



## 7. Appendices Continued

<b>Country</b>	<b>Discussants</b>	<b>Country</b>	<b>Discussants</b>
Australia	Professor Alan W. Black Dr Sue Chambers Professor Sandy Gifford Assoc Prof Graeme Hawthorne Erik Okerstrom Professor Mark Rapley Professor Peter Saunders Professor Mark Stokes Professor Mark Wooden	Italy	Simone Gerzeli Professor Carla Rondi
Brazil	Professor Flávio Saliba Cunha	Japan	Professor Keiko Takahashi
Canada	Assist Professor Piers Steel Dr Donald Schopflocher	Netherlands	Professor Ruut Veenhoven Dr Irene van Kamp Professor Bernard M.S. van Praag
England	Professor Pascale Allotey Nic Marks	Switzerland	Dr des. Alois Stutzer
France	Andrew Clark	Taiwan	Professor Luo Lu
Germany	Professor Wolfgang Glatzer	USA	Professor Iris Chi Professor Richard Estes Associate Professor Michael R. Hagerty Professor Kenneth C. Land Professor Robert W. Marans Professor James J. Potter Professor M. Joseph Sirgy

<b>Country</b>	<b>Project Researchers</b>
Algeria	Dr Nabil Bouzid
Argentina	Lia Rodriguez de la Vega
Australia	Professor Mitchell K. Byrne Dr David Mellor John Thomas Shima Sum
Hong Kong	Frank Ho-yin
Iran	Professor Alireza Agha Yousefi
Malaysia	Fatimah Haron
Mexico	Dr Beatriz Yasuko Arita Watanabe
The Netherlands	Dr Jacqueline J.A.M. Schenk
USA	Dr Whitney Boling (Ph.D., CHES)

## Appendix B

### Construct Validity – Australian Data

The Tables below represent the regression of the seven domains of the Personal Wellbeing Index against ‘Satisfaction with life as a whole’. Since the theoretical basis for the selection of domains is that they represent the First Level Deconstruction of Life as a Whole, each domain should make a unique contribution to the explained variance.

Each Table is based on a separate analysis for the PWI conducted as a part of the Australian Unity Wellbeing Index regular surveys. Each survey number is indicated in the top-left corner of each table. The full data set for each survey, and the associated full Report, is available from [http://acqol.deakin.edu.au/index\\_wellbeing/index.htm](http://acqol.deakin.edu.au/index_wellbeing/index.htm)

Each analysis involves a standard multiple regression with an N of about 2,000. The  $s^2$  statistic describes the amount of unique variance contributed by each domain. It is calculated by squaring the PART coefficients, output from SPSS. For example, in Survey 1 below, the unique contribution of Standard of living to the total explained variance in ‘Life as a whole’ is  $.060 \times 100 = 6.0\%$ . Between them, the seven domains contribute 14.8% in unique variance. This means that their major contribution to ‘life as a whole’ is in terms of shared variance ( $.49 - .148 = .367$ , or, 36.7% shared variance)

Three aspects of these Tables are notable as:

1. The outcomes are very consistent with one another
2. The domains make very unequal unique contributions
3. The domain of ‘Safety’ consistently makes no unique contribution and, so, fails to meet the criterion for inclusion. However, it has been retained since data from other countries (see Appendix C) indicate that it does make a unique contribution in other cultures.

Survey 1	1	2	3	4	5	6	7	B	$\beta$	$s^2$
1. Life as a whole								.31**	.31	.060
2. Standard of living	.58							.12**	.13	.014
3. Health	.41	.37						.23**	.21	.030
4. Achievements in life	.53	.45	.34					.19**	.21	.034
5. Personal relationships	.45	.32	.24	.38				-.01	-.01	.002
6. How safe you feel	.25	.30	.27	.20	.19			.08**	.09	.006
7. Community connect.	.38	.35	.24	.37	.25	.30		.05**	.06	.002
8. Future security	.44	.50	.34	.44	.29	.40	.43			
								Total explained unique variance		.148
								Total explained shared variance		.367
										[for an explanation of ‘unique’ and ‘shared’ see text above]
**p<.01; *p<.05										
Adj R <sup>2</sup> = .49										

Survey 2	1	2	3	4	5	6	7	B	$\beta$	$s^2$	
1. Life as a whole								.35**	.34	.070	
2. Standard of living	.62							.07**	.08	.005	
3. Health	.36	.39						.21**	.20	.029	
4. Achievements in life	.52	.45	.29					.21**	.24	.042	
5. Personal relationships	.51	.41	.23	.37				.03	.03	.001	
6. How safe you feel	.27	.28	.22	.18	.17			.07**	.08	.005	
7. Community connect.	.38	.33	.22	.31	.31	.33		.06**	.07	.003	
8. Future security	.43	.44	.27	.38	.31	.40	.38				
										Total explained unique variance	.155
										Total explained shared variance	.365
**p<.01; *p<.05											
Adj R <sup>2</sup> = .52											

7. Appendices Continued

Survey 3	1	2	3	4	5	6	7	B	β	sr <sup>2</sup>
1. Life as a Whole								.29**	.30	.061
2. Standard of Living	.57							.07**	.09	.006
3. Health	.35	.32						.23**	.23	.039
4. Achievements	.53	.39	.30					.17**	.21	.034
5. Relationships	.45	.31	.18	.37				.03*	.04	.001
6. Safety	.31	.30	.26	.24	.21			.03	.03	.001
7. Community	.30	.25	.18	.29	.29	.27		.13**	.14	.013
8. Future security	.48	.49	.30	.39	.24	.42	.32			
Total explained unique variance										.155
Total explained shared variance										.355

\*\*p<.01; \*p<.05  
Adj R<sup>2</sup> = .51

Survey 4	1	2	3	4	5	6	7	B	β	sr <sup>2</sup>
1. Life as a Whole								.36**	.37	.089
2. Standard of Living	.61							.10**	.12	.011
3. Health	.39	.34						.20**	.20	.027
4. Achievements	.52	.43	.33					.17**	.21	.035
5. Relationships	.48	.35	.24	.36				.00	.00	0.00
6. Safety	.27	.28	.26	.23	.20			.06**	.07	.004
7. Community	.36	.29	.22	.35	.31	.34		.04*	.05	.002
8. Future security	.43	.47	.27	.41	.30	.43	.41			
Total explained unique variance										.168
Total explained shared variance										.352

\*\*p<.01; \*p<.05  
Adj R<sup>2</sup> = .52

Survey 5	1	2	3	4	5	6	7	B	β	sr <sup>2</sup>
1. Life as a Whole								.29**	.29	.057
2. Standard of Living	.56							.10**	.11	.010
3. Health	.36	.36						.25**	.25	.043
4. Achievements	.55	.44	.32					.18**	.22	.040
5. Relationships	.47	.31	.18	.39				.00	.00	0.00
6. Safety	.25	.25	.19	.24	.21			.06**	.07	.004
7. Community	.33	.27	.17	.32	.27	.31		.05**	.06	.002
8. Future security	.39	.44	.24	.37	.27	.46	.36			
Total explained unique variance										.156
Total explained shared variance										.334

\*\*p<.01; \*p<.05  
Adj R<sup>2</sup> = .49

Survey 6	1	2	3	4	5	6	7	B	β	sr <sup>2</sup>
1. Life as a Whole								.29**	.31	.068
2. Standard	.55							.10**	.11	.011
3. Health	.36	.29						.23**	.24	.042
4. Achieve	.52	.39	.33					.17**	.20	.032
5. Relationships	.45	.31	.22	.35				-.02	-.02	.000
6. Safety	.24	.26	.23	.19	.19			.05**	.06	.003
7. Community	.34	.33	.17	.32	.29	.27		.08**	.10	.007
8. Future Security	.39	.39	.29	.29	.26	.47	.32			
Total explained unique variance										.163
Total explained shared variance										.317

\*\*p<.01; \*p<.05  
Adj R<sup>2</sup> = .48

Survey 7	1	2	3	4	5	6	7	B	β	sr <sup>2</sup>
1. Life as a Whole								.29**	.30	.059
2. Standard	.56							.10**	.12	.012
3. Health	.35	.29						.23**	.23	.035
4. Achieve	.53	.43	.32					.19**	.20	.033
5. Relationships	.46	.33	.22	.39				-.01	-.01	0.00
6. Safety	.26	.28	.23	.23	.25			.02	.02	.000
7. Community	.31	.34	.17	.31	.26	.32		.10**	.11	.008
8. Future Security	.45	.48	.25	.42	.30	.40	.41			
Total explained unique variance										.147
Total explained shared variance										.333

\*\*p<.01; \*p<.05  
Adj R<sup>2</sup> = .48

<sup>a</sup>Total Unique = .15; shared = .33

7. Appendices Continued

Survey 8	1	2	3	4	5	6	7	B	$\beta$	$sr^2$
1. Life as a Whole										
2. Standard	.56							.30**	.29	.060
3. Health	.36	.32						.10**	.12	.012
4. Achieve	.54	.39	.29					.24**	.24	.040
5. Relationships	.51	.33	.19	.41				.21**	.25	.049
6. Safety	.26	.25	.24	.18	.21			.02	.02	0.00
7. Community	.36	.31	.16	.36	.28	.34		.05**	.06	.003
8. Future Security	.42	.42	.27	.38	.29	.43	.40	.06**	.07	.003
								Total explained unique variance		.167
								Total explained shared variance		.353

\*\*p<.01; \*p<.05  
Adj R<sup>2</sup> = .52

Survey 9	1	2	3	4	5	6	7	B	$\beta$	$sr^2$
1. Life as a Whole										
2. Standard	.54							.26**	.26	.045
3. Health	.35	.32						.08**	.09	.008
4. Achieve	.57	.44	.32					.26**	.27	.049
5. Relationships	.48	.33	.23	.42				.18**	.21	.033
6. Safety	.22	.28	.22	.21	.17			-.03	-.03	.001
7. Community	.39	.34	.19	.35	.30	.26		.08**	.10	.008
8. Future Security	.43	.48	.26	.41	.28	.43	.42	.07**	.08	.004
								Total explained unique variance		.148
								Total explained shared variance		.342

\*\*p<.01; \*p<.05  
Adj R<sup>2</sup> = .49

## Appendix C

### Construct Validity – Other Countries

#### (Examples)

The Tables below represent the regression of the seven domains of the PWI against 'Satisfaction with life as a whole'. Since the theoretical basis for the selection of domains is that they represent the First Level Deconstruction of 'Life as a Whole' (LAW) domain should make a unique contribution to the explained variance.

Each Table is based on a separate analysis for the indicated survey. The full data set for each survey is available either from **TABLE** or from the researcher concerned.

Each analysis involves a standard multiple regression. The PART  $r^2$ (%) column is derived from squaring the PART coefficients, output from SPSS, and describes the percentage of unique variance contributed by each domain.

#### ALGERIA

Researcher: Habib Tiliouine <htiliouine@yahoo.fr>

Sample: General population N=1417

Variable	LAW	1.	2.	3.	4.	5.	6.	B	$\beta$	$sr^2$
1. Standard of living	.65							.37*	.35	.073
2. Health	.60	.54						.23*	.24	.032
3. Achieve in life	.51	.46	.48					.10*	.09	.005
4. Personal rel/ships	.47	.37	.49	.50				.08*	.09	.005
5. Safety	.43	.42	.42	.38	.42			.00	.00	.000
6. Comm. connect	.48	.39	.45	.42	.45	.50		.09*	.09	.005
7. Future security	.50	.45	.38	.47	.39	.51	.51	.14*	.13	.000
									Total explained unique variance	.120
									Total explained shared variance	.450
* p<.001										
Adjusted R <sup>2</sup> = .57										

#### ARGENTINA

Researcher: Graciela Tonon <edelvais@arnet.com.ar>

Sample: 2002, General population, N=492

Variable	B	$\beta$	$sr^2$
1. Standard of Living	.28**	.34	.066
2. Health	.06*	.09	.005
3. Achieve	.16**	.19	.018
4. Relations	.01	.01	0.0
5. Safety	.06*	.10	.006
6. Community	.11**	.16	.019
7. Future Security	-.01	-.01	0.0
Total explained unique variance			.114
Adjusted R <sup>2</sup> = .39			Total explained shared variance
			.276
* p < .05    ** p < .001			

Sample: 2003, General population, N=189

Variable	LAW	1.	2.	3.	4.	5.	6.	B	$\beta$	sr <sup>2</sup>
1. Standard of living	.69							.38**	.46	.046
2. Health	.44	.48						.05	.06	.008
3. Achieve in life	.62	.58	.43					.24**	.31	.032
4. Personal rel/ships	.40	.36	.29	.48				-.01	-.01	.001
5. Safety	.47	.52	.37	.63	.48			-.06	-.11	0.11
6. Comm. connect	.45	.31	.28	.37	.52	.50		.15**	.23	.028
7. Future security	.45	.55	.36	.51	.23	.62	.34	.01	.01	.001
R <sup>2</sup> = .59								Total explained unique variance		.127
Adjusted R <sup>2</sup> = .57								Total explained shared variance		.443

\*\* p&lt;.001

Sample: 2004, General population, N=268

Variable	LAW	1.	2.	3.	4.	5.	6.	B	$\beta$	sr <sup>2</sup>
1. Standard of living	.52							.34**	.38	.034
2. Health	.27	.26						.13*	.14	.013
3. Achieve in life	.41	.32	.11					.22**	.23	.020
4. Personal rel/ships	.31	.26	.10	.38				.10	.11	.010
5. Safety	.22	.27	.08	.32	.27			.01	.01	.001
6. Comm. connect	.17	.17	.02	.28	.17	.19		.02	.02	.002
7. Future security	.10	.16	.05	.21	.25	.22	.24	-.04	-.05	.005
								Total explained unique variance		..085
								Total explained shared variance		.283

\*\* p&lt;.001 \*p&lt;.005

R<sup>2</sup> = .37<sup>a</sup> Adjusted R<sup>2</sup> = .35

## CHINA - HONG KONG

Researcher: Anna Lau &lt;rsalau@inet.polyu.edu.hk&gt;

Sample: General population N=180

Variable	LAW	1.	2.	3.	4.	5.	6.	B	$\beta$	sr <sup>2</sup>
1. Standard of living	.50							.25*	.42	.100
2. Health	.30	.39						.14	.07	.000
3. Achieve in life	.56	.53	.36					.27**	.23	.030
4. Personal rel/ships	.41	.38	.33	.50				.14**	.19	.030
5. Safety	.34	.45	.44	.36	.33			.08	.00	.000
6. Comm. connect	.36	.26	.20	.17	.27	.27		.10	.08	.010
7. Future security	.40	.54	.37	.48	.43	.18	.46	.03	.01	.000
								Total explained unique variance		.170
								Total explained shared variance		..390

\* p&lt;.005

R<sup>2</sup> = .76<sup>a</sup> Adjusted R<sup>2</sup> = .56<sup>a</sup>Unique variability = .17; shared variability = .39

Sample: General population N=460

Variable	LAW	1.	2.	3.	4.	5.	6.	B	$\beta$	sr <sup>2</sup>
1. Standard of living	.60							.33**	.32	.060
2. Health	.43	.39						.11**	.13	.010
3. Achieve in life	.60	.55	.41					.32**	.32	.060
4. Personal rel/ships	.40	.49	.46	.44				.01	.07	.000
5. Safety	.46	.44	.47	.43	.45			.01*	.09	.000
6. Comm. connect	.47	.37	.30	.36	.52	.43		.16**	.15	.010
7. Future security	.44	.48	.45	.46	.45	.61	.44	.01	.02	.000
								Total explained unique variance		.140
								Total explained shared variance		..360

\* p&lt;.005

R<sup>2</sup> = .51<sup>a</sup> Adjusted R<sup>2</sup> = .50<sup>a</sup>Unique variability = .15; shared variability = .36

## SLOVAKIA

Researcher: Jozef Dzuka &lt;dzukaj@saris.unipo.sk&gt;

Sample: 2003, General population adults, N=133

Variable	LAW	1.	2.	3.	4.	5.	6.	B	$\beta$	$sr^2$
1. Standard of living	.49							.38	.35	.078
2. Health	.24	.43						-.05	-.05	.002
3. Achieve in life	.31	.42	.46					.05	.04	.001
4. Personal rel/ships	.31	.34	.26	.49				.10	.11	.008
5. Safety	.37	.47	.29	.38	.24			.11	.10	.008
6. Comm. connect	.32	.25	.30	.19	.30	.36		.14	.14	.014
7. Future security	.29	.34	.35	.33	.17	.34	.41	.06	.06	.003
								Total explained unique variance		.114
								Total explained shared variance		.146
* p<.005										
R <sup>2</sup> = .31 <sup>a</sup> Adjusted R <sup>2</sup> = .26										
<sup>a</sup> Unique variability = .08; shared variability = .23										

## Appendix D

### Mediation and Moderation

Mark Stokes <stokes@deakin.edu.au>  
School of Psychology  
Deakin University

#### Moderation

Let's assume we have three variables. The *DV* and two main effect variables, *A* and *B*. Moderation is the interaction of two variables, *A* by *B* (*AB*, we'll call it *C*), that when combined give rise to a difference in the dependent variable. To calculate moderation effects, first subtract the mean effect from each variable.

ie:  $New\_A = A - \bar{A}$  &  $New\_B = B - \bar{B}$  where  $\bar{A}$  &  $\bar{B}$  each represents the mean of *A* and *B*.

We then multiply  $New\_A$  by  $New\_B$  to obtain *C*. This is called centering, and ensures that the interaction variable, *C*, does not correlate with either of the main effect variables. In truth it will correlate, not in a simple manner, but in a higher order non-linear manner that for General Linear Statistics we don't need to worry about (see Figure 1).

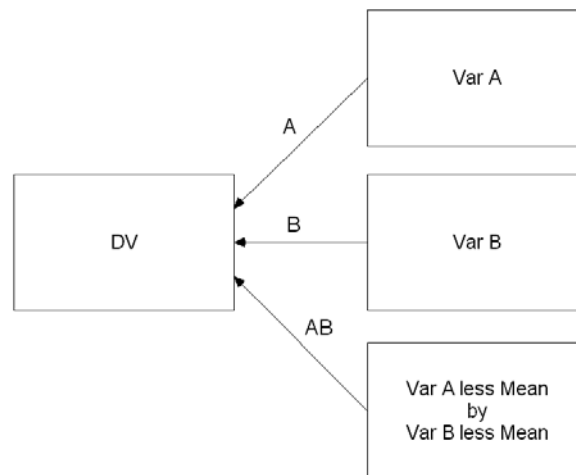


Figure 1: Testing moderation

To test whether our new interaction variable is significant, we need to establish that it adds something more than either *A* or *B* alone. So, first we must test the effect of *A* and then the effect of *B*. To do this we undertake a simple hierarchical regression.

In step one, we enter *A* and *B* as separate effects (note, these are the uncentered variables), and obtain their significance. We enter both at the same time, because as main effects, neither has precedence over the other.

In the second step, we enter *C* and assess if it adds anything to the model by testing its significance. If it adds to the model, the effect will be significant, if it doesn't, the effect will be non-significant. If the interaction is significant, then *A* can be said to moderate *B*, and *B* can be said to moderate *A*. Neither variable has precedence. In other words, *B* differs over levels of *A*, and *A* differs over levels of *B*.



Naturally, if you find significant moderation, there is more that must be done. However, this is a topic for another day.

### Example

Everyone knows that the further you go from the city, generally the cheaper land gets. However, the further you go from the city, the more expensive building costs get. Because the price of Home Ownership consists of several costs, including the Cost of Land, and the Cost of Building, the price of Home Ownership does not reduce in proportion with the distance from the city. At great distances, the cost of Home Ownership may get extravagant, because they are so expensive to build. Clearly, Distance from the City and the Type of Cost interact (Figure 2).

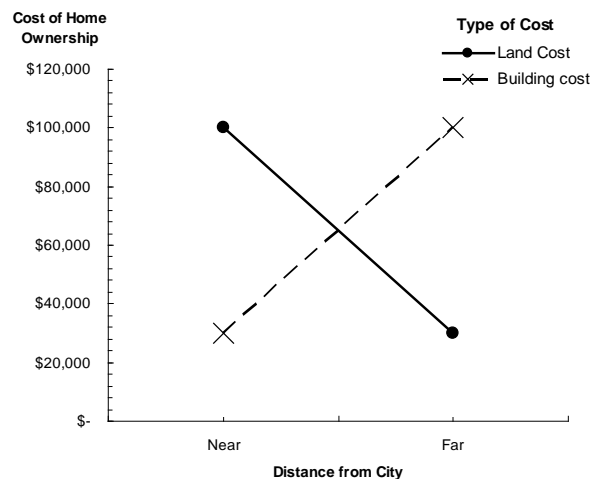


Figure 2: Interaction of the cost and distance

The variables are DV: Cost of Home Ownership, IVA: Distance from the City, IVB: Type of Cost.

First centre the variables. Subtract the average of Distance from City from Distance from City to obtain the centered Distance from City, and then do the same for the Type of Cost, by subtracting the average cost from Type of Cost. Then multiply the Type of Cost by the Distance from City to obtain the interaction term. This removes the linear correlation between the interaction term and each of the IVs.

Next build a Hierarchical Regression model (Figure 3), where in the first step you enter Type of Cost and the Distance from City. Then in the second step, enter the interaction of the two variables. If the interaction is significant, then for some distance from the city the type of cost differs from other distances from the city. If the interaction is not significant, then the main effects of Type of Cost and Distance from City account for the effect of Cost of Home Ownership.

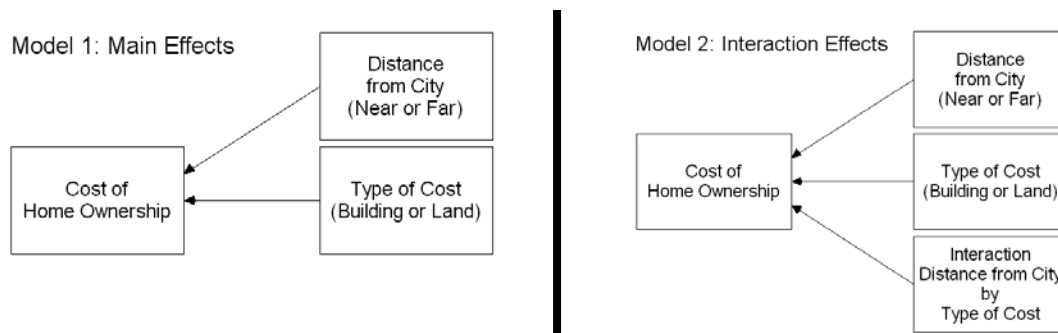


Figure 3: Hierarchical regression model of Interaction. To the left is the first model. Note the interaction term is absent. To the right is the second model with the interaction term included.

### Mediation

Of the two concepts, mediation is by far the most difficult to understand. However, a simple, everyday example is fuel prices. Petrol prices are caused by many things. The most obvious one is the price being charged by oil producing nations for a barrel of oil. Another is the greed of petrol companies.

As the cost per barrel of oil increases, petrol prices also increase, as the price of oil per barrel decreases, the price of petrol decreases. These two observations suggest a direct relationship between the price of oil and the price of petrol. However, if oil company executives at Starfish Oil decide that when the price of oil per barrel goes down, they will only lower the price of fuel by half that amount, the greed of the petrol company mediates the price of petrol. Experience teaches us that the price of petrol is more under the control of petrol companies than it is the prices of barrels of oil, though; clearly the price of a barrel of oil is important.

If we call the relationship between the price of a barrel of oil and the price of petrol A, the relationship between the price of oil and the greed of petrol companies B, and the relationship between the greed of oil companies and the price of petrol C, then we have specified a mediating relationship (see Figure 4).

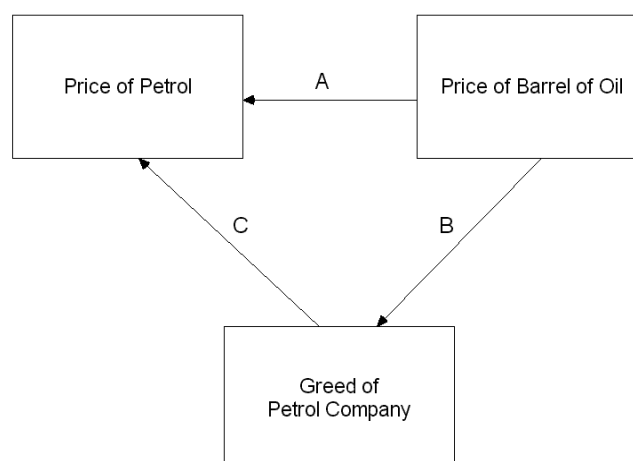


Figure 4: Mediation model.

We test mediation in one of several ways, but the easiest and clearest is to test the relationships in a hierarchical model. First test relationship A, then test relationship B, then test relationship C. We then have three b-weights and their standard errors. Then in a fourth model test A and C. If the relationship A goes non-significant, and C is significant, we have prima facie evidence that there is a

mediating relationship. However, mediation is rarely this clear, so we use a formula to assess if the indirect effect of B through C is significant.

$$Z = \frac{BC}{\sqrt{(B^2 \times SE_C^2 + C^2 \times SE_B^2 + SE_C^2 \times SE_B^2)}}$$

The formula is:  $Z = \frac{BC}{\sqrt{(B^2 \times SE_C^2 + C^2 \times SE_B^2 + SE_C^2 \times SE_B^2)}}$ . The result we obtain is a straight forward Z-score that we look up in a table of Z-scores to obtain the level of significance. If this is significant, then we have a significant mediator, even if the relationship A is also significant.

### Mediating Moderators & Moderating Mediators

It is possible to have a mediating variable that is the moderator. To test this, construct the moderator variable, interaction, as before (ie: variables A by B), and test the mediating pathways as described in mediation (see Figure 5).

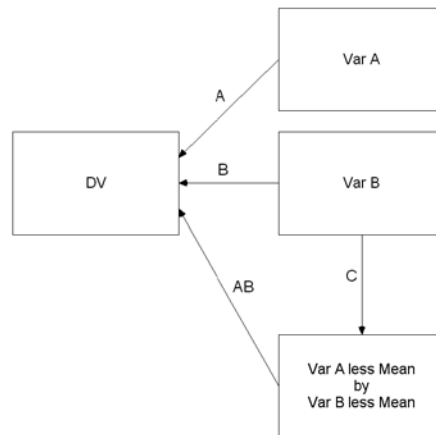


Figure 5: Mediating Moderator

It is also possible to have a moderating mediator, which is not the same as a mediating moderator. To test this, first establish if two or more variables are significant mediators, and then derive their interaction as before, and then test this interaction (see Figure 6). If significant, the mediators are moderating, which may then be checked further to see if the interaction variable also mediates. If it does, then you have a mediating moderator mediator. This process may proceed ad infinitum.

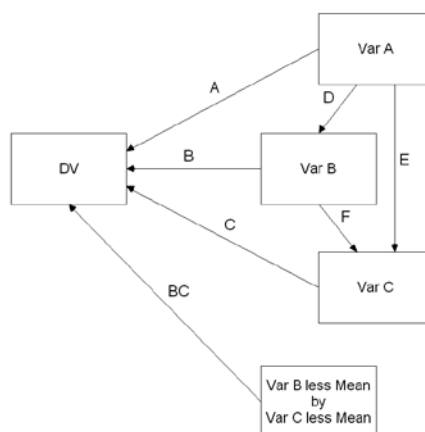


Figure 6: Mediating Moderator

## Appendix E

### Normative Data from Report 16.0 of the Australian Unity Wellbeing Index

#### Normative Ranges Calculated from Individual Data

Table E1: Normative Ranges Calculated from Aggregated Individual Data

	N	Mean	SD	-2 SD	+2 SD
PWI	30613	74.92	12.36	50.20	99.64
Standard	31555	77.25	17.36	42.53	111.97
Health	31544	75.01	19.79	35.43	114.59
Achieving	31431	73.82	18.20	37.42	110.22
Relationships	31462	79.37	21.13	37.11	121.63
Safety	31463	77.94	18.30	41.34	114.54
Community	31387	70.41	20.04	30.33	110.49
Future Security	31082	70.47	19.95	30.57	110.37
Life as a whole	31534	77.48	17.35	42.78	112.18
NWI	26861	61.04	14.89	31.26	90.82
Economic situation	30912	64.76	19.25	26.26	103.26
Environment	31245	59.44	19.16	21.12	97.76
Social conditions	31097	61.87	18.51	24.85	98.89
Government	29226	54.43	24.76	4.91	103.95
Business	28275	61.03	18.42	24.19	97.87
National security	28676	63.63	19.54	24.55	102.71
Life in Australia	31409	81.76	18.06	45.64	117.88

#### Normative Ranges Calculated from Survey Mean Scores

Table E2: Normative Ranges Calculated from Survey Mean Scores

	Mean	SD	-2 SD	+2 SD
PWI (N=16)	74.93	.75	73.43	76.43
Standard	77.25	.99	75.27	79.23
Health	75.01	.60	73.81	76.21
Achievements	73.82	.96	71.90	75.74
Relationships	79.37	1.17	77.03	81.71
Safety	77.95	1.50	74.95	80.95
Community	70.42	.92	68.58	72.26
Future Security	70.48	1.18	68.12	72.84
Life as a whole	77.48	.88	75.72	79.24
NWI*	61.06	1.01	59.04	63.08
Economic situation	64.79	3.77	57.25	72.33
Environment	59.45	1.32	56.81	62.09
Social conditions	61.87	1.17	59.53	64.21
Government*	54.43	1.57	51.29	57.57
Business*	61.04	2.03	56.98	65.10
National security*	63.64	2.39	58.86	68.42
Life in Australia	81.76	4.01	73.74	89.78

\*N=15 since data were not available for Survey 1.