

# Quality of Life in Macau, China

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**Abstract** We report the initial findings of an ongoing, long-term investigation into subjective quality of life in Macau, a Special Administrative Region of China. Data were collected via quarterly public surveys (2007 to 2009;  $n = 8,230$ ), as part of the Macau Quality of Life Report. The main aims of the study were to: (a) ascertain the public's satisfaction with life and with the regional situation in Macau; (b) confirm the utility of the International Wellbeing Index (IWI) as a measure of subjective life quality; and (c) contribute to ongoing discussion in the literature on quality of life in China. The data indicated moderate levels of personal (PWI = 64.4; range 63–66.7) and national (NWI = 59.7; 57.4–63.7) wellbeing across the study period, which implies that residents in Macau are generally satisfied with life. The lowest scores were reported in the first quarter of 2009, a period of great economic uncertainty in Macau and the world, but were positioned within the normative range. The IWI demonstrated good psychometric performance, consistent with previous studies in China and the West, which confirmed its utility. These findings are discussed in relation to the IWI's theoretical underpinnings and the literature.

**Keywords** China · International Wellbeing index · Macau · Quality of life

## 1 Introduction

Quality of life (QOL) has emerged as a prominent policy and social endeavor, and is attracting interest among practitioners and scholars in a wide range of countries and disciplines (Glatzer et al. 2004; Sirgy et al. 2006). However, research in the People's Republic of China is still in its infancy, particularly on subjective QOL. Most studies were

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conducted in Shangdong and Guangdong provinces, whilst other areas have received little or no attention (Chen and Davey 2008a). A good example of the paucity of research is the Macau Special Administrative Region (SAR)—a small enclave situated on China's southeast coast—where few studies have been conducted. In response to this situation, the overarching aim of this article is to address the need for more data.

In recent years, the Macau SAR Government has been more appreciative of QOL research. In 2006, the Chief Executive of Macau approved the establishment of a centre dedicated to research, known as the Research Center for Sustainable Development Strategies (formerly, the Center for the Studies of Quality of Life; hereinafter CEEDS, in its Portuguese acronym). Its main objective is to survey QOL in Macau to furnish data for the government's policy development. The CEEDS developed an "Objective Indicator System of Quality of Life in Macau" to measure QOL via demographic structure, economic data, education, employment, healthcare, housing, public safety, etc. In addition, another government body, the Statistics and Census Bureau, regularly publishes official data on the region's economy, education, health, security, infrastructure, unemployment, etc.

These government initiatives are encouraging, and provide useful data on a wide range of QOL topics, but focus mostly on objective QOL. Yet, there is a general consensus among scholars and other experts that the subjective dimension should be considered. In a general sense, objective and subjective QOL indicators tell the same story, but their relationship is complex, and disparities can exist. This is exemplified by economic growth in rich countries that has not resulted in happier populations, even in those that have experienced massive increases in wealth (Diener and Biswas-Diener 2000). Discrepancies also exist between economic and other well-being indicators such as physical and mental health, social relationships, and societal conditions (Diener and Seligman 2004).

It is difficult to discuss subjective QOL within Macau because research is almost non-existent. Two studies were carried out by the CEEDS in 2005 ( $n = 2,000$ ) and 2007 ( $n = 3,500$ ), in which people were asked about their life satisfaction and happiness, including a set of questions regarding concerns with social problems such as gambling, income inequality and inflation. The results of these studies are available on the CEEDS website ([www.ceeds.gov.mo](http://www.ceeds.gov.mo)), and a summary has been published by Wu and Lam (2010). According to their data, about 40% (2005, 41.2%; 2007, 44.5%) of respondents reported being "satisfied" or "very satisfied" with life, and about 50% (2005, 48.8%; 2007, 50.9%) were "happy" or "very happy". A minority (2005, 13.4%; 2007, 11.1%) reported being "very dissatisfied" or "dissatisfied". These studies reveal that most people in Macau seem to be happy and satisfied with life. They also reveal public concern about Macau's social problems, as respondents said that income inequality, gambling, criminality, drugs, etc., have worsened. The authors also reported that respondents with lower incomes had lower levels of happiness and satisfaction. This research provides valuable insights into life quality in Macau, but more studies are needed.

The authors of the present paper are involved in a new project to survey subjective QOL in Macau. The Macau Quality of Life Report is an on-going, large-scale public survey of subjective QOL, established in 2007 by the University of Saint Joseph (formerly known as the Macau Inter-University Institute) in partnership with a local media group (DeFicção Projectos Multimédia). Therefore, the first aim of this paper is to report the initial findings of The Macau Quality of Life Report, consisting of public surveys conducted from 2007 to 2009.

Our project utilizes the International Wellbeing Index (IWI), a well known measure of subjective life quality, developed by Professor Robert Cummins at Deakin University, Australia. The IWI comprises two sub-scales: Personal Wellbeing Index (PWI) and

National Wellbeing Index (NWI). The PWI measures subjective QOL via seven life domains: standard of living, personal health, life achievement, personal relationships, personal safety, community-connectedness and future security (an eighth domain, religion and spirituality, was added recently, but does not form part of the Macau data reported here). Statements in the PWI include: ‘‘How satisfied are you with your standard of living?’’; ‘‘How satisfied are you with your personal relationships?’’; and ‘‘How satisfied are you with your future security?’’. Respondents’ scores for each domain are averaged, and can be analysed either separately or summed to yield an overall domain score (known as the PWI score), representative of the question: ‘‘How satisfied are you with your life as a whole?’’ (Cummins et al. 2003a; Cummins 1998; International Wellbeing Group 2006). In contrast, the NWI measures respondents’ satisfaction with country conditions, i.e., national wellbeing (in our study, regional wellbeing), via six domains: economic situation, state of environment, social conditions, government, business, and national security. Chinese and English versions of the IWI are available from the Australian Center on Quality of Life (ACQOL; [www.acqol.deakin.edu.au](http://www.acqol.deakin.edu.au)).

Each domain in the IWI embodies a broad aspect of life, amenable across subpopulations, countries, and cultures. Therefore, the IWI has been used globally. An exciting development in recent years is the application of the IWI in various provinces and regions in China, including Beijing, Fujian, Guangdong, Hong Kong, Hubei, Hunan, Liaoning, Shangdong, Sichuan, Tibet, etc. (Huang and Xing 2005; Lau et al. 2005, 2008; Davey et al. 2009; Chen and Davey 2009; Nielsen et al. 2009, 2010; Webb 2009; Smyth et al. 2010). In all of these studies, the IWI demonstrated good psychometric performance, which concurred with results in previous Australian and other surveys.

The studies conducted by Lau et al. (2005) and Chen and Davey (2009) are particularly relevant to our study in Macau because they were done using the same methodology, in adjacent cities that have some similarities in cultural background. The IWI’s ability to generate stable and consistent results in Hong Kong and Zhuhai, as well as other locations in China, presents persuasive evidence of its likely equivalence in Macau. However, it should also be noted that the validation of the IWI for Chinese populations is a work in progress, and more work is needed. Moreover, differences between Macau, Hong Kong, and Mainland China—such as different regional governments, economic development, and socio-cultural conditions—caution against assumptions. Macau was a Portuguese colony from the Sixteenth Century until 1999, and therefore has a different culture and society than Hong Kong (a former British colony) and Mainland China. It operates as part of the ‘‘one country, two systems’’ policy of China, in which Macau continues to maintain its own legal system, monetary system, etc.; according to the Sino-Portuguese Joint Declaration and the Basic Law of Macau, the city should continue to operate with a high degree of autonomy until at least 2049 (50 years after the handover of Macau to China). Also, unlike Hong Kong, Macau has not established itself as a financial or trading hub and, therefore, its economy is not as sophisticated. However, the development of the gaming industry since the liberalization of the industry in 2002 has reduced the gap in objective economic indicators between these two cities. Based on these differences, it is instructive to evaluate the IWI’s suitability in Macau. With this in mind, the second aim of the present study is to report the IWI’s psychometric properties (i.e., reliability and validity) in our surveys. Previous research findings in Hong Kong and Zhuhai can be used to compare our findings.

Research by numerous scholars over several decades has led to the conclusion that the majority of people seem to be satisfied with life when their social and physical needs are met (Diener and Diener 1996; Cummins 1995). This seems to hold true in China,

exemplified in several IWI surveys across the country that consistently reveal moderate levels of subjective wellbeing (Davey et al. 2009; Chen and Davey 2009; Lau et al. 2005; Webb 2009; Nielsen et al. 2010). It has been suggested, therefore, that there is a normative range for life satisfaction; that is, self-reported subjective QOL scores are skewed slightly above average in normal populations (Cummins 1995, 1998). Cummins's (1995, 1998) analysis of life satisfaction scores in major geographic regions of the world indicated that, on a 0–100 measurement scale, there seems to be a normative range of approximately 60–80 (non-Western populations) or 70–80 points (Western populations), evidence perhaps of a normative range. Subsequent research in Chinese societies (Chen and Davey 2008b) has shown that data there generally conform to the normative range, although more research is needed. The normative range, if it exists, could be a useful reference point or standard against which to judge whether subjective QOL is higher or lower than expected (Cummins 1995). Therefore, it seems worthwhile to explore if the data we collected in Macau are in agreement with the range, first to ascertain if the majority of people are satisfied with life; and, second, to provide a basis for establishing a benchmark for evaluating data collected in the future. This is the third aim of the present study.

In summary, this report builds upon the emerging literature on subjective QOL in China and Macau. It reports subjective life quality among a large sample of the general public in Macau. The aims of this study are to:

- (a) Ascertain the public's satisfaction with life and with the regional situation in Macau;
- (b) Confirm the utility of the IWI as a measure of subjective QOL in Macau, in terms of its psychometric properties and congruence with previous studies; and
- (c) Contribute to ongoing discussion of subjective QOL in Chinese societies, such as the normative range.

## 2 Method

### 2.1 Location and Sample

Macau is a small city and region (29.2 km<sup>2</sup>) in southeast China, located on the western-side of the Pearl River Delta. It borders Guangdong Province to the north, and the South China Sea to the east and south. The economy is based primarily on gambling and tourism revenues; other economic activities include banking, financial services and manufacturing. The official languages are Chinese (Cantonese) and Portuguese.

The present study took place at the University of Saint Joseph, situated in the south of the Macau peninsula. Samples of residents in Macau were surveyed between March 2007 and August 2009 via eight quarterly surveys (four consecutive quarters during 2007, and four consecutive quarters from the fourth quarter of 2008 to the third quarter of 2009). The survey could not be conducted every quarter during this period due to funding availability and needs of the project's partners.

Telephone interviews were administered by research assistants (undergraduate students) at the University of Saint Joseph, under the supervision of a project leader. The assistants attended a training course about the project's objectives and survey techniques, and were fluent in English and Chinese (Cantonese, Mandarin). A pre-designed Computer Assisted Telephone Interface (CATI) assisted in call monitoring. The total sample for all eight surveys was 8,230, and was representative of Macau's demographic profile (Table 1).

**Table 1** Demographic characteristics of the sample

	<i>N</i>	%	Missing	Valid
Gender			0	8,230
Male	3,769	45.8		
Female	4,461	54.2		
Age			38	8,154
18–25	2,468	30.3		
26–35	1,670	20.5		
36–45	1,897	23.3		
46–55	1,449	17.8		
56–65	488	6.0		
65+	220	2.7		
Marital status			67	8,096
Single	3,410	42.1		
Married	170	53.3		
De facto/living together	4,315	5.1		
Divorced	125	1.5		
Separated	20	0.2		
Widowed	123	1.5		
Education			69	8,092
Primary school	1,460	17.9		
Secondary school	3,973	48.7		
Further/higher education	2,728	33.4		
Household monthly income			328	7,574
Up to MOP9,999	1,526	20.1		
MOP10,000–19,999	2,686	35.5		
MOP20,000–29,999	2,135	28.2		
MOP30,000–39,999	1,008	13.3		
MOP40,000–49,999	410	5.4		
MOP50,000+	137	1.8		

## 2.2 Instrument and Procedure

The survey schedule consisted of two sections. The first section was the IWI (PWI and NWI items), answered on an 11-point end-defined Likert scale, and anchored from completely dissatisfied (0) to completely satisfied (10). In accordance with previous studies (e.g., Lau et al. 2005; Chen and Davey 2009), two additional questions (“How satisfied are you with your life as a whole?” and “How satisfied are you with life in Macau”) were included to assess construct validity (see later). The second section gathered demographic data.

The Chinese version of the IWI was provided by the International Wellbeing Group. It has been used in previous research, following thorough translation and piloting (e.g. Lau et al. 2005; Chen and Davey 2009). Prior to our study, pilot work in Macau ensured the methodology was appropriate, including respondents’ perceptions of the survey schedule and an enquiry into the acceptance, applicability and understanding of the IWI. No difficulties were reported during the pilot work and project.

The IWI was administered in verbal format. A standardized administration procedure was followed: Informed consent was granted from each participant, and anonymity was assured. The interviewers checked participants' understanding of the response mode before proceeding with the survey; and only residents (as opposed to tourists and visitors) were included. This was followed by the survey schedule.

### 2.3 Definition of QOL

The study of QOL, especially in China, is fraught with difficulties. A challenging issue for researchers is the problem of terminology (Diener 2006). In particular, there is no universal definition of subjective QOL, or a single, unifying theory. A wide range of terms—such as happiness, life satisfaction, personal wellbeing, positive and negative affect, subjective wellbeing, etc.—are used frequently in the literature, but often with different meanings and measurement. Therefore, it is not always clear if a study probes the construct it purports to measure, or if findings across studies reveal information about a similar construct. Another issue is that these terms across countries and cultures, although often assumed to be universal, can conjure different meanings. This is particularly the case in the Chinese language (Lau et al. 2005). Although this methodological challenge is worth exploring further, it is beyond the scope of our project in Macau. Therefore, for the sake of simplicity, we sidestep the issue by adopting 'subjective QOL' as an umbrella term to broadly denote people's evaluations of life and the circumstances in which they live.

Another thorny issue is measurement (Diener 2006). The QOL field is characterized by a large number of instruments. For example, the ACQOL website lists many hundreds of scales that purport to measure QOL in one form or another. China is no exception to this issue: Chen and Davey (2008a) found that Chinese scholars use a range of subjective QOL measures, including scales developed in China. On the one hand, scale diversity is useful because the choice of instrument depends on various factors, e.g., study aims, sample type, socio-cultural context, etc. Further, research benefits from concurrent utility of multiple measures, to offer a range of perspectives (Diener and Biswas-Diener 2000). However, the plethora of instruments also has drawbacks. Instruments differ in their characteristics—such as question wording, number and type of items, rating format, instructions to respondents, etc.—and have mixed psychometric quality. The use of different instruments across studies can hinder the ability to explore trends and draw conclusions, as it is not always clear if they reveal information about a similar construct.

For these reasons, although we encourage our colleagues to embrace the diversity of QOL measures, we believe the IWI has several advantages in some situations. The IWI taps broad aspects of life, amenable across countries and subpopulations and, therefore, can be used as a universal measure to compare cross-country findings. Unlike many QOL instruments (which are often designed for highly selected groups), the IWI domains are sufficiently broad to apply to most people, suitable for all sections of a population. Therefore, we can compare the findings of our study with data collected elsewhere in China and other countries. Furthermore, versions of the PWI have been developed for the general adult population (PWI-A), school-age children and adolescents (PWI-SC), pre-school-age children (PWI-PS), and people with an intellectual disability or other form of cognitive impairment (PWI-ID). This approach is unique, and is particularly advantageous as the parallel versions permit a comparison of the PWI scores of subpopulations with those of the general public (McGillivray et al. 2009). As our aim in the future is to explore QOL in subpopulations in Macau, the present study offers useful data for norm-referencing the findings of future studies.

Moreover, the IWI taps domain-level subjective QOL, which is regarded as more reliable than single-item measures, breaking down the global construct into the minimal set of domains that make a unique and significant contribution to subjective QOL (International Wellbeing Group 2006). Finally, the IWI has been used in a number of studies in China, and its validation in the Chinese context is a work in progress. Thus, by applying the IWI in another context within China, this study contributes to ascertaining its suitability as a measure of subjective QOL.

## 2.4 Data Analysis

Prior to analysis, data were screened for outliers, and adjusted to eliminate response sets. Next, Likert scale data were standardized into units of %SM on a 0–100 distribution; and descriptive statistics summarized domain ratings. All quarterly survey data were combined into one dataset to investigate the importance of demographic variables and to determine reliability, validity and construct interrelationships. Statistical tests included ANOVA (one-way and multi-factor), bivariate correlation, Cronbach  $\alpha$ , and principal components analysis (PCA). IWI data were regressed against the additional items to establish construct validity.

## 3 Results

### 3.1 Satisfaction Ratings of the IWI

Means and standard deviations of the PWI and NWI items are listed in Table 2. For all quarterly surveys, PWI domain scores ranged from 59.4 (SD = 17.8) to 69.4 (SD = 15.8) and the overall PWI score was 64.4. Personal relationships, health and personal safety

**Table 2** Ratings of the PWI and NWI items

IWI domain	M	SD
<i>PWI</i>		
Personal relationships	69.4	15.8
Health	67.6	17.5
Personal safety	66.2	16.4
Standard of living	63.5	15.4
Community	62.9	17.5
Future security	61.6	17.7
Achievement in life	59.4	17.8
PWI score	64.4	11.6
<i>NWI</i>		
Territorial security	65.3	15.6
Economic situation	62.7	16.0
Business	59.8	15.2
Social conditions	58.6	15.8
State of the environment	56.6	17.0
Government	55.2	18.6
NWI score	59.7	12.0

domain scores were higher than the PWI score, whereas standard of living, life achievement, community connectedness, and future security were lower. NWI mean domain ratings ranged from 55.2 (SD = 18.6) to 65.3 (SD = 15.6), and the overall NWI score was 59.7 (SD = 12); satisfaction ratings with business, economic situation and regional security were higher than the NWI score, whereas the other domain scores were lower (Table 2).

Mean domain scores were ranked from highest to lowest (Table 3). In the PWI, life achievement, future security, and community connectedness were ranked lowest; whereas personal relationships, health and personal safety were highest. In the NWI, satisfaction with government, state of environment and social conditions were ranked lowest; whereas satisfaction with business, economic conditions and regional security were highest. These rankings were generally stable throughout the eight quarterly surveys (Table 3).

There was no gender difference in the PWI and NWI scores and domain scores. There was a significant correlation between PWI and age ( $r = -0.45$ ,  $n = 8,192$ ,  $P = < 0.001$ ) and between PWI and education background ( $r = 0.121$ ,  $n = 8,161$ ,  $P = < 0.001$ ), but no correlations between these variables and the NWI (age:  $r = 0.007$ ,  $n = 8,192$ ,  $P = 0.534$ ; education background:  $r = 0.003$ ,  $n = 8,161$ ,  $P = 0.757$ ; Table 4). Household gross monthly income correlated with both the PWI ( $r = 0.215$ ,  $n = 7,902$ ,  $P = < 0.001$ ) and NWI ( $r = 0.068$ ,  $n = 7,902$ ,  $P = < 0.001$ ; Table 4). An ANOVA test revealed a significant difference in PWI scores between divorced and married people ( $F_{58,157} = 3.445$ ,

**Table 3** PWI and NWI scores and ranks for each quarterly survey

	Survey 1 (1st Quarter 2007)	Survey 2 (2nd Quarter 2007)	Survey 3 (3rd Quarter 2007)	Survey 4 (4th Quarter 2007)	Survey 5 (4th Quarter 2008)	Survey 6 (1st Quarter 2009)	Survey 7 (2nd Quarter 2009)	Survey 8 (3rd Quarter 2009)
PWI score	63.40	63.90	64.44	63.80	63.34	63.00	65.49	66.70
NWI score	60.20	57.60	59.60	59.88	57.93	57.35	61.00	63.70
<i>PWI rankings</i>								
Life achievement	7	7	7	7	7	7	7	7
Future security	6	5	6	6	6	6	6	6
Community	5	6	5	5	4	4	4	5
Living standard	4	4	4	4	5	5	5	3
Health	3	2	2	2	2	2	2	2
Relationships	2	1	1	1	1	1	1	1
Personal safety	1	3	3	3	3	3	3	4
<i>NWI rankings</i>								
Environment	6	5	5	5	5	5	5	5
Government	5	6	6	6	6	6	6	6
Social conditions	4	4	4	4	4	2	4	4
Business	3	3	3	3	3	3	3	3
Economy	2	2	2	2	2	4	2	2
Regional security	1	1	1	1	1	1	1	1



**Table 4** Correlations between satisfaction scores and age and education level

	Age	Education background	Household gross monthly income
PWI	-0.045(**)	0.121(**)	0.215(**)
Standard of living	-0.084(**)	.133(**)	0.224(**)
Health	-0.097(**)	0.055(**)	0.138(**)
Achievement in life	-0.033(**)	0.134(**)	0.202(**)
Personal relationships	0.006	0.051(**)	0.082(**)
Personal safety	0.023(*)	0.056(**)	0.109(**)
Community	0.004	0.052(**)	0.107(**)
Future security	-0.034(**)	0.101(**)	0.179(**)
NWI	0.007	0.003	0.068(**)
Economic situation	-0.071(**)	0.036(**)	0.058(**)
State of environment	0.057(**)	-0.021	0.069(**)
Social conditions	0.011	-0.009	0.050(**)
Government	0.022	-0.009	0.014
Business	-0.028(*)	0.014	0.049(**)
Regional security	0.033(**)	0.008	0.062(**)

\* Correlation is significant at the 0.05 level (2-tailed)

\*\* Correlation is significant at the 0.01 level (2-tailed)

$P = 0.04$ ); Tukey post-hoc comparisons of groups indicated that married (PWI = 64.50) and single (PWI = 64.47) respondents reported significantly higher scores than divorcees (PWI = 61.37).

### 3.2 Internal Reliability and Validity

The IWI and its subscales had high internal reliabilities: Cronbach  $\alpha$  was 0.90 for IWI (PWI = 0.82; NWI = 0.83). Item-total correlations (Table 5) ranged from 0.47 to 0.58

**Table 5** Corrected item-total correlations and regression with “life as a whole”

Domain	Item-total correlations	Life as a whole	B	$\beta$	$Sr^2$
<i>PWI<sup>a</sup></i>					
Living standard	0.547	0.548	0.37	0.35	0.083
Health	0.483	0.382	0.09	0.10	0.007
Life achievement	0.555	0.436	0.12	0.13	0.011
Personal relationships	0.470	0.347	0.08	0.08	0.004
Personal safety	0.548	0.372	0.07	0.07	0.004
Community	0.530	0.319	0.03	0.03	0.001
Future security	0.584	0.381	0.06	0.06	0.003
<i>NWI<sup>b</sup></i>					
Economic situation	0.546	0.508	0.27	0.28	0.056
Environment	0.542	0.436	0.11	0.12	0.010
Social conditions	0.624	0.495	0.16	0.16	0.013
Government	0.576	0.468	0.12	0.14	0.011
Business	0.545	0.387	0.03	0.03	0.000
Regional security	0.492	0.388	0.10	0.10	0.008

<sup>a</sup>  $R^2 = 0.378$ ; Adjusted  $R^2 = 0.378$ ; Total explained unique variability = 11.2%; shared variability = 26.6%. All are significant at  $p < 0.01$  level

<sup>b</sup>  $R^2 = 0.392$ ; Adjusted  $R^2 = 0.392$ ; Total explained unique variability = 10%; shared variability = 29.2%. All are significant at  $P < 0.01$  level

(PWI) and 0.49 to 0.62 (NWI), which indicates good internal consistency and reliability. To determine the unique contribution of the domains to the additional item 'life as a whole', the former were regressed against the latter: The PWI explained 38% of the variance, and the NWI explained 39% (Table 5). Domain inter-item correlations show that highest correlations within the PWI were between future security and life achievement (0.476); and between living standard and life achievement (0.474; Table 6). In the NWI, highest correlations were between government and social conditions (0.578), social conditions and environment (0.550), and business and government (0.514); furthermore, each domain score correlated highly with the overall scale score (Table 6).

Domain items were subjected to a PCA, followed by a varimax rotation (Table 7). All assumptions for this analysis were met: Inspection of the correlation matrix revealed that all items inter-correlated at  $> 0.30$ ; The Kaiser-Meyer-Okin value was 0.9, exceeding the recommended minimum value (Kaiser 1970, 1974); and Bartlett's Test was significant ( $P < 0.01$ ), supporting the correlation matrix's factorability (Bartlett 1954). PCA revealed the emergence of two components with eigenvalues greater than 1.0, accounting for 39.3% (Component 1) and 11.5% (Component 2) of the variance (Table 7). Following varimax rotation, both components showed strong loadings, ranging from 0.593 to 0.688 (PWI) and 0.596 to 0.783 (NWI), and every item loaded on only one component (Thurstone 1947). These findings are consistent with previous research (e.g., Lau et al. 2005; Chen and Davey 2009).

#### 4 Discussion

This study addresses the need for more data on subjective QOL in Macau. As few public surveys have been conducted, we investigated residents' satisfaction with life and with living conditions in Macau.

The first aim of the study was to report the initial findings of The Macau Quality of Life Report, which is a large-scale, long-term public survey of subjective QOL. The IWI data (Tables 2 and 3) show that the surveys' respondents were, on average, satisfied with life. The PWI score was 64.4 (Range: 63–66.7;  $SD = 11.6$ ), and all domain scores were above the scale midpoint, which is indicative of a moderate, positive level of personal wellbeing. That PWI scores remained constant throughout the eight surveys (Table 3), and in a large sample size, indicates that the public's contentment with life is stable and not based on recent events. This is confirmed by the ratings of the NWI, which imply that respondents were generally satisfied with conditions in Macau (note: the NWI score is lower than PWI because it presumably operates at a more abstract level, and has been found in previous studies to fall within the range 55–65%; Cummins et al. 2003a,b; Tiliouine et al. 2006). These data are consistent with the broader inference in the literature that most people seem to be happy with life when basic needs are met.

It is perhaps not surprising that the public in Macau is satisfied with life. With some exceptions, there is generally an absence of factors which could lead to prolonged unhappiness. Macau is a wealthy region, classified as a high income economy by the World Bank, among the most prosperous societies in Asia (Asian Development Bank 2007). The recent de-monopolizing of the gambling industry induced significant investment inflows into the region, which contributed to further rapid economic growth (Statistics and Census Service 2010). Despite living in a small city, people in Macau enjoy excellent and modern infrastructure and services such as education, health and security. This level of development is likely to be conducive to satisfying life experiences. Another reason to expect a

**Table 6** Domain inter-item correlations

	1	2	3	4	5	6	7	8	9
Life as a whole	1								
Living standard	0.548(**)	1							
Health	0.382(**)	0.397(**)	1						
Life achievement	0.436(**)	0.474(**)	0.394(**)	1					
Personal relationships	0.347(**)	0.344(**)	0.363(**)	0.337(**)	1				
Personal safety	0.372(**)	0.382(**)	0.394(**)	0.380(**)	0.443(**)	1			
Community	0.319(**)	0.341(**)	0.297(**)	0.375(**)	0.397(**)	0.390(**)	1		
Future security	0.381(**)	0.420(**)	0.356(**)	0.476(**)	0.339(**)	0.416(**)	0.422(**)	1	
Life in Macau	0.339(**)	0.398(**)	0.312(**)	0.335(**)	0.291(**)	0.350(**)	0.315(**)	0.382(**)	1
Economy	0.282(**)	0.347(**)	0.283(**)	0.301(**)	0.258(**)	0.303(**)	0.280(**)	0.328(**)	0.508(**)
Environment	0.230(**)	0.266(**)	0.227(**)	0.314(**)	0.201(**)	0.279(**)	0.309(**)	0.314(**)	0.436(**)
Social conditions	0.257(**)	0.321(**)	0.261(**)	0.322(**)	0.235(**)	0.310(**)	0.332(**)	0.361(**)	0.495(**)
Government	0.244(**)	0.296(**)	0.225(**)	0.289(**)	0.213(**)	0.269(**)	0.311(**)	0.348(**)	0.468(**)
Business	0.239(**)	0.284(**)	0.232(**)	0.283(**)	0.202(**)	0.263(**)	0.300(**)	0.311(**)	0.387(**)
Regional security	0.204(**)	0.234(**)	0.243(**)	0.229(**)	0.233(**)	0.301(**)	0.245(**)	0.280(**)	0.388(**)
PWI	0.575(**)	0.686(**)	0.667(**)	0.719(**)	0.659(**)	0.702(**)	0.672(**)	0.718(**)	0.493(**)
NWI	0.330(**)	0.397(**)	0.333(**)	0.395(**)	0.304(**)	0.391(**)	0.404(**)	0.442(**)	0.610(**)

**Table 6** continued

	10	11	12	13	14	15	PWI	NWI
Life as a whole								
Living standard								
Health								
Life achievement								
Personal relationships								
Personal safety								
Community								
Future security								
Life in Macau								
Economy	1							
Environment	0.381(**)	1						
Social conditions	0.451(**)	0.550(**)	1					
Government	0.421(**)	0.487(**)	0.578(**)	1				
Business	0.419(**)	0.396(**)	0.496(**)	0.514(**)	1			
Regional security	0.358(**)	0.369(**)	0.440(**)	0.404(**)	0.410(**)	1		
PWI	0.435(**)	0.397(**)	0.445(**)	0.406(**)	0.390(**)	0.366(**)	1	
NWI	0.685(**)	0.730(**)	0.797(**)	0.788(**)	0.727(**)	0.670(**)	0.553(**)	1

\*\* Correlation is significant at the 0.01 level (2-tailed)

**Table 7** Factor analysis of the IWI items

Rotated component matrix <sup>a</sup>	Component	
	1 (NWI)	2(PWI)
Standard of living	0.226	0.659
Health	0.134	0.662
Achievements in life	0.223	0.675
Personal relationships	0.085	0.688
Personal safety	0.202	0.682
Community	0.271	0.593
Future security	0.301	0.637
Economic situation	0.596	0.301
State of the environment	0.702	0.192
Social conditions	0.783	0.219
Government	0.774	0.172
Business	0.719	0.177
Territorial security	0.627	0.193
Eigenvalues	5.105	1.495
% of variance	39.628	11.5

<sup>a</sup> Extraction Method: Principal Component Analysis; Rotation Method: Varimax with Kaiser Normalization

positive level of personal wellbeing is that the data came from the general population, not according to medical, psychiatric, or socio-economic criteria. It is possible that a study among other samples in Macau might reveal lower PWI and NWI scores. Also, the inclusion of more questions in the IWI, or concurrent use of complementary measures, might reveal some dissatisfaction with persistent social problems in Macau such as corruption, property price, income inequality, organized crime, prostitution, financial crime, legal loopholes, etc., as hinted in the data collected by the CEEDS (Wu and Lam 2010).

It is interesting to note that our first survey took place in the first quarter of 2007, a period when Macau was in an economic boom; the fifth survey took place during the fourth quarter of 2008, when the economic and financial crisis shook the world and Macau; and the last survey was conducted in the third quarter of 2009, a period of economic recovery. Macau was not immune to the world's economic troubles. After liberalizing its gaming industry in 2002, the economy experienced extraordinary growth, fueled by the gaming, hospitality and construction industries. For example, by 2006 the gaming market in Macau had surpassed Las Vegas to become the biggest in the world. However, in the middle of 2008, the gaming industry halted. After growing in 2007 at a quarterly rate ranging from 43.5 to 48.9%, growth peaked at 61.8% in the first quarter of 2008, but then started a downward spiral until it contracted by 2.3% in the fourth quarter, and then dropped even more (Zhang and Kwan 2009). Given the relative importance of this industry, the overall economy of Macau was affected, e.g., unemployment increased in many sectors, and several key infrastructural and private investment projects were cancelled or postponed (Statistics and Census Service 2010). The most notorious example was Las Vegas Sands, one of the leading gaming operators in Macau, which, reportedly at the verge of bankruptcy in the 4th quarter of 2008, laid off 11,000 workers and stopped all investments in Macau (e.g. Jinks 2008; Marquez 2008). These events had knock-on material effects on the housing and job markets and, presumably, on the confidence of Macau's residents.

However, it seems that subjective QOL, as measured in our surveys, was not affected during these events. Although lower scores were reported during the first quarter of 2009,

they were not significantly different to other quarters. The NWI domain “satisfaction with the economic situation” dropped from the second-highest ranked position to fourth position in the first quarter of 2009, perhaps an indication that the economic downturn might have been of some concern; but it did not impinge on the overall scores. Another mismatch between objective and subjective QOL measures is evident when our findings are compared to previous studies in the adjacent cities of Hong Kong and Zhuhai. Similar to our study, Chen and Davey’s (2009) public survey in Zhuhai also indicated a positive level of wellbeing, as the PWI score was 64.4 (range 58.7 to 69.9) and the NWI score was 57.4 (range 51.1 to 67.2). Lau et al. (2005) noted a PWI score of 65.9 in Hong Kong. These scores are consistent across Hong Kong, Macau and Mainland China, despite differing levels of economic development, living standards and wealth. This issue requires further investigation, but discrepancies between objective and subjective QOL are not a new finding in the QOL literature (Diener and Biswas-Diener 2000; Diener and Seligman 2004). This justifies more emphasis in Macau on subjective QOL, to complement existing objective indicators.

The second aim of the present study was to report the psychometric properties of the IWI in the Macau dataset. It is instructive to evaluate the IWI’s suitability for Macau, so that it can be used there as a subjective QOL measure. This is particularly important for the authors of the present paper, who are continuing with The Macau Quality of Life Report. In our study, the IWI demonstrated good psychometric performance, and results concur with previous studies in China and the West. For example, the IWI’s domains had a minimum Cronbach  $\alpha$  value of 0.90, and all item-total correlations were high. A coherent one-factor structure emerged for each subscale which explained about 35 and 14% of variance. The PWI and NWI scores, and domain rankings, were stable throughout the eight quarterly surveys (Table 3). There was also remarkable consistency of the present findings to those obtained previously from Hong Kong and Zhuhai, which are adjacent to Macau. Therefore, it is concluded here, tentatively, that the IWI has utility for Macau, although this topic will be revisited at a later stage when more survey data are collected.

When IWI domains are ranked (Table 3), it is interesting to note that, in the PWI, relationships, health, and safety are the most satisfying; and community connections, future security, and life achievement are least important. For the NWI, state of the environment received the lowest ranking, whereas regional security was highest. It is difficult to explain this finding without further research. It might be that this ranking reveals aspects of life that are more satisfying than others. However, the rankings in our survey are similar to those obtained in Hong Kong and Zhuhai (Lau et al. 2005; Chen and Davey 2009), and, therefore, might be a reflection of the conceptual level at which PWI and NWI operate, or perhaps an artifact of the IWI. Therefore, future research should probe reasons underlying this difference.

The final aim of the present study was to investigate whether subjective QOL in Macau is in agreement with the normative range. The PWI score in all quarterly surveys was within Cummins’s normative range for non-Western countries, which is approximately 60–70%SM. This finding concurs with Chen and Davey’s (2008a, b) recent reanalysis of population data in Chinese societies. The generalisability of the range to Macau has important implications. Researchers there can now consider using it as a standard against which to judge whether survey respondent’s QOL is better or worse off than normal. Furthermore, data obtained in the present study are consistent with the ‘Theory of Subjective Wellbeing Homeostasis’, the theoretical underpinning of the IWI, which posits that an individual’s life satisfaction is maintained generally within a narrow range by an active set of psychological mechanisms. The positioning of our study’s data within this range, and

its stability throughout the survey period, supports the proposition that a psychological homeostatic mechanism might be in operation, which is a possible avenue for future research.

In summary, the present study is important because it reveals residents' subjective QOL in Macau. The findings show that respondents were generally content with life and with conditions in the region. Further, the IWI demonstrated good psychometric performance, confirming its utility. Collectively, these results justify continuation of The Macau Quality of Life Report, a project that is ongoing, and calls for more research. There are also important implications: As stated earlier, more public surveys of subjective QOL are needed, both in Macau and elsewhere in China, as there is currently a paucity of research. Currently, economists and policy makers in the region emphasize tangible measures, such as wealth and economic prosperity, whilst overlooking social indicators. Also, research in China is limited by its preliminary status, overuse of student samples, and low number of empirical studies (Chen and Davey 2008a). It is hoped that this paper will serve as a primer to encourage policy makers, politicians and researchers to pay more attention to subjective QOL, which should be a key goal around which economic, health, and social policies are developed. There is a need to put QOL issues on top of the agenda to develop policies and other conditions that enhance and maintain individual and population happiness. It is suggested here that other cities and regions in China should consider setting up projects similar to The Macau Quality of Life Report.

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