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The psychometric properties of the Quality of Life Inventory in an Australian community sample

Abstract

The Quality of Life Inventory (QOLI, Frisch, 1994) is an importance-weighted measure of life satisfaction, which has been found to possess adequate psychometric properties in US and clinically-based samples. The current study aimed to investigate the normative distribution, factor structure and key psychometric properties of the QOLI in an Australian general community sample. Results indicated the Australian sample (*n* = 259) reported slightly better quality of life than the US-based standardization sample. Confirmatory factor analyses showed that a three-factor model provided the best fit for the data. Psychometric properties were all generally found to be adequate and close to Frisch's (1994) reported levels. In conclusion, this study indicated the QOLI may be used in the Australian context with confidence. Future research could examine the clinical utility of the three-factor model.

Quality of life assessment has grown in importance in clinical practice. Whilst it has been conceptualized and defined in a number of ways, a major approach to quality of life assessment is the subjective perspective (Anderson & Burckhardt, 1999; Leathard and Cook, 2009). This approach equates quality of life with subjective well-being (Berger, Leven, Pirente, Bouillon, & Neugebauer, 1999) and seeks to gain the "insider's perspective" in relation to their satisfaction with various aspects of their lives (Brown, Dijkers, Gordon et al., 2004). Such assessment asks the respondent to evaluate the degree to which their most important needs, goals and wishes have been fulfilled (Frisch,1994).

The subjective approach provides insights into the personal relevance and meaning people assign to aspects of their own wellbeing, which is valuable from a clinical viewpoint (Brown & Gordon, 1999). Clinicians and clinical researchers routinely use measures of subjective quality of life to measure outcomes in relation to treatment and recovery. A great deal of research has been undertaken in the area, with hundreds of scales developed to date (e.g.Cummins, 2010). In brief, some important features to be considered in selecting a measure include:

Dimensionality in questionnaire design: In contrast to global or single item scales (e.g. Andrews & Withey, 1976), a multidimensional approach to scale construction assesses life experience across a number of defined domains or life area such as work, relationships, finances, leisure pursuits and living conditions (Dijkers, 2004). Research has recommended use of multidimensional measures of subjective quality of life to clarify meanings of domains or life area and optimize reliability of self-reporting (e.g. Bullinger, 2002; Johnson & Miklos, 2002).

Importance weighting of domains: This allows respondents to rate the relative importance of each domain to their overall well-being, and reflect this in the overall scale score. Whilst some critics have argued that importance ratings adds little to the scale (e.g. Trauer & Mackinnon, 2001), many clinical researchers have insisted that importance weighting is necessary to ensure differences in respondents' values across domains are understood (Brown, Gordon, & Haddad, 2000; Bullinger, 2002; Dijkers, 2004; Kalpakjian, Lam, Toussaint, & Hansen Merbitz, 2004).

Psychometric integrity: As with any scale, it is important that measures of subjective quality of life are thoroughly investigated to establish their reliability, validity and normative characteristics within the population of interest.

The Quality of Life Inventory (QOLI, Frisch 1994)

The QOLI was developed for use within medical and mental health contexts with a US-based standardization sample, and has features consistent with the above requirements (Frisch1994). Since its development, it has been used extensively in clinical and research applications such as measuring outcomes in depression treatment (Andersson et al., 2005; Frisch, 1998), and anxiety treatment (Bourland et al., 2000; Carlbring, Nordgren, Furmark, & Andersson, 2009; Jakupcak, Wagner, Paulson, Varra, & McFall, 2010).

The QOLI is grounded in Frisch's quality of life theory (Frisch,1994; Frisch,1998), which equates quality of life with life satisfaction. It is a measure of life satisfaction across particular domains of life. The QOLI has 16 well defined domains: Health, Self-esteem, Goals and values, Money, Work, Play, Learning, Creativity, Helping, Love, Friends, Children, Relatives, Home, Neighbourhood, and Community. Within

each domain respondents first rate the importance of that domain to their happiness on a three point scale: 0=Not important 1=Important, and 2=Extremely important. They then rate their satisfaction with each domain from -3=Extremely, -2=Somewhat, and -1 A=little dissatisfied to +1=A little, +2=Somewhat and +3=Extremely satisfied for each domain. The QOLI is scored by multiplying importance-scores by satisfaction-scores for each of the 16 domains and then calculating an average across domains.

Frisch(1994) reported the results of a standardization study with 798 adult participants from 12 US states, matched as closely as possible to the 1990 US Census. As well as reporting the distribution for the scale, Frisch reported the QOLI had sound psychometric properties, including:

- *Internal consistency:* α=.79.
- *Temporal stability:* A subsample of 55 participants provided retest scores after approximately two weeks (*M*=14.4 days, *SD*=3.9 days), *r*=.73, *p*<.001.
- *Convergent and discriminant validity*: The QOLI was significantly correlated with other measures of subjective quality of life, including the Satisfaction with Life Scale (Diener, Emmons, Larsen, & Griffith, 1985), *r*=.56, *p*<.001, and Quality of Life Index (Ferrans & Powers, 1985) *r*=.75, *p*<.001.
- *Criterion validity*: The QOLI has been found to be related to general psychopathology, depression and anxiety (Frisch, Cornell, Villanueva and Retzlaff, 1992; Frisch 1994). It has been found to predict academic retention 1 to 3 years in advance both by itself and with Grade Point Average (Frisch, Clark, Rouse, Rudd, Paweleck, Greenstone and Kopplin, 2005).

- *Treatment sensitivity*: The QOLI has been demonstrated to possess sensitivity to treatment outcomes across a range of mental conditions including depression and anxiety disorders, showing similar improvement in scores as direct measures of pathology (see Frisch, 1994; Frisch, et al., 2005).

- *Response bias*: A weak relationship between the QOLI and Crowne-Marlowe Social Desirability Scale (Crowne & Marlowe, 1960) indicated the effect of a socially desirable response set was minimal, r=.25, p<.001.

Whilst these results show the instrument is robust in the general US population, no research to date has examined whether these properties and the normative distribution are relevant to the general Australian population. Although there are many basic similarities between the US and Australia, there are a number of differences in language and culture that may bear on the way people interpret and rate responses on measures such as the QOLI. Differences in population size and standards of living may also affect the way people interpret their circumstances and set their expectations. As such, it is necessary to examine the characteristics of the QOLI in an Australian sample. Further work is also needed to clarify the factor structure of the measure in the local population.

Previous clinical research provides evidence for several factor structures for the QOLI. Table 1 provides the results of four studies, each reporting results of confirmatory factor analyses. The major differences between the structures include self-oriented and other-oriented factors in the two-factor model, the emergence of a self actualization factor in the three-factor model and separation of environment domains out of the other-oriented factor in the four factor solution. The one, two and four-factor models were each analysed with all 16 QOLI domains and no

modifications were reported to improve fit to the models in those previous studies. In our previous work, leading to the development the three-factor model we removed two QOLI domains (Children and Friends), as their loadings were weak in relation to the relevant factors (Thomas, Skilbeck and Slatyer, 2009). We reported a modification to the model in the confirmatory analyses, which allowed error variables on the Neighbourhood and Community domains to covary.

Insert Table 1 about here

Some limitations were noted in relation to these studies listed in Table 1. Firstly, there is some doubt about the validity of the unidimensional model. Whilst Frisch and Sanford (2003) report results supporting the unidimensional model, recent research by Lunney and Schnurr (2007) reported poor fit to the single-factor model (CFI =.79 and .75, RMSEA=.103 and .105 respectively). A major limitation of the study of the two-factor model by McAlinden and Oei (2006) was their use of exploratory and confirmatory analyses on the same sample. A limitation of our previous study of the three-factor model (Thomas et al. 2009) with Australian adults who had suffered traumatic brain injury was that some participants may not have been able to provide an accurate estimate of their SQOL, due to cognitive and mood problems associated with their injuries. Overall, these studies were only conducted within clinical samples. The present research sought to address these issues by comparing the fit of data from a non-clinical Australian sample across all of these models.

In summary, the QOLI is a useful measure of subjective quality of life. It has demonstrated sound psychometric properties in US-based research and there is evidence of a number of viable factor structures for this measure. Given the cultural differences between Australia and the US, it is necessary to investigate the structure,

normative distribution and psychometric properties of the QOLI within the Australian population. As such, the aims of the present study were to:

1. Compare the distributions of the QOLI of an Australian non-clinical population sample with Frisch's (1994) US-based normative distribution.
2. Compare the fit of data from an Australian sample with the factor structures confirmed in separate clinical studies.
3. Compare key psychometric properties of the QOLI in the Australian sample with Frisch's (1994) US-based standardization study.
4. Examine the relationships between the QOLI in the Australian sample on key demographic variables.

Method

Design

This study utilized a cross-sectional design with a sample of Australian adults who were living independently in the community and free from physical and mental health problems. Efforts were made to stratify the sample by gender and age. A subsample returned retest data for the QOLI approximately two weeks after completing the first surveys.

Participants

Responses to the surveys were received from 274 adults. Data screening eliminated 15 responses due to incomplete data, leaving 259 participants' data for analysis. The demographic characteristics of the Australian sample are presented and compared with the US-based normative sample in the Results.

Measures

Quality of Life Inventory (Frisch, 1994): Details on the construction, administration and psychometric properties of this scale are described above.

The Satisfaction with Life Scale (SWLS, Diener, Emmons, Larsen, & Griffin, 1985): The SWLS is a five item global measure of life satisfaction. Respondents provide a rating on Likert scales ranging from 1=strongly disagree to 7=strongly agree. For example, “In most ways my life is close to ideal”, “I am satisfied with my life”. The SWLS is scored by summing the five item scores. Higher scores indicate greater life satisfaction.

Research has shown the SWLS has good internal consistency, α=.87, and test-retest reliability, *r*=.89 over two weeks and *r*=.82 over a two month period (Pavot and Diener, 1993). Validity studies have shown the SWLS correlates with other scales measuring similar constructs and it is sensitive to clinical populations (Pavot & Diener, 1993).

The Quality of Life Index (QLI, Ferrans & Powers, 1985): The QLI is a 66-item measure of subjective quality of life, which is divided into two parts. The first part asks the respondent to rate their satisfaction on 33 areas of their life using a Likert scale, where 1=very dissatisfied, 2=moderately dissatisfied, 3=slightly dissatisfied. The second part asks how important the same areas of life are to the participant and uses the same type of Likert scale 1=very unimportant to 6=very important. A total score for the QLI is calculated by multiplying importance scores by satisfaction scores and summing the item scores into a total score. Higher scores indicate greater life satisfaction on valued areas of life (Ferrans & Powers, 1985).

Internal consistency for the QLI total score was α=.93 and with graduate students and α=.90 with dialysis patient samples. Test-retest reliability was *r*=.87

over a two week period and .81 over a month. The QLI was shown to correlate strongly with a single item tapping subjective quality of life with graduate students, *r*=.75, and dialysis patients, *r*=.61 (Ferrans & Powers, 1985). The SWLS and QLI were included as part of analyses examining the convergent validity of the QOLI.

The Depression Anxiety Stress Scales (DASS 21,Lovibond & Lovibond, 1995): The DASS is a 21-item short form of the DASS 42-item self-report scale. It asks respondents to indicate the presence of specific symptoms over the past week rating 0=Did not apply to me at all, 1=Applied to me to some degree, or some of the time, 2=Applied to me to a considerable degree, or a good part of time; 3=Applied to me very much, or most of the time. Scores are then summed for each scale. Higher scores indicate more severe problems on each of the three scales.

The DASS 21 has demonstrated excellent reliability and validity. Henry and Crawford (2005) reported internal consistency for the Depression scale α=.88, Anxiety scale was α=.82 and Stress scale was α=.90. Construct validity has been shown to be sound with strong relationships demonstrated between the subscales and other measures of depression, anxiety and psychological distress including the Beck Depression Inventory *r*=.74 and Beck Anxiety Inventory *r*=.81 (Henry & Crawford, 2005; Lovibond & Lovibond, 1995). These scales were included as part of analyses examining the divergent validity of the QOLI.

The Social Desirability Scale-17 (SDS-17, Stober, 2001), is a 17-item measure of social desirability, suitable for adults of 18 to 80 years of age. Examples of statements include: “I sometimes litter” and “In traffic I am always polite and considerate of others”. We removed one item asking about drug use due to ethical concerns. In responding to this scale, participants rated each statement as true or false. Each response is accorded a score, true=1 and false=2, these scores are then

summed for a total social desirability score. The lower the score the more the participant is considered to be influenced by self-presentation.

Procedure and analyses

Ethical approval was gained from the relevant University Committee. Information sheets and the survey forms were then distributed to a convenience sample of community dwelling adults, with efforts made to stratify the sample by age and gender. Participants were recruited from family and acquaintances of a group of five fourth year Psychology students, as part of their dissertation projects. Participants returned written surveys and a subsample were asked to return a QOLI retest approximately two weeks after returning the initial surveys. Analyses were conducted using SPSS v.18 and AMOS17.

Analyses commenced with examination of distributions of the measures. QOLI scores were compared with Frisch's (1994) US-based distribution. Confirmatory factor analyses were conducted and fit indices were inspected to determine the best fitting model. Internal consistency was examined using Cronbach's alpha. Retest reliability was examined with correlations, as were convergent and divergent validity with the other measures. T-tests and correlations were used to explore the relationships between the QOLI and demographic variables.

Results

The results are presented in five sections. First, the demographics of the Australian sample are compared with Frisch's (1994) sample. The distributions of QOLI Total scores of the Australian general population sample are compared with the US-based normative distribution published by Frisch(1994). The fit of the data

from the Australian sample are then compared with the four factor structures previously identified in the literature. The reliability and validity of the measure are then examined in the present sample and compared with the US-based standardization sample (Frisch,1994). Relationships between the QOLI and key demographic variables are investigated within the local sample.

Demographic characteristics of the Australian sample

A little over half the Australian sample was female (141, 54%). In comparison, Frisch's (1994) US-based normative sample reported females made up 65% (n=798). The mean age of the Australian sample was 48.75 years (SD=17.52, Min=18 Max=91), which was significantly older than Frisch's US-based sample (Mean=36.20, SD= 12.10), t (258) = 11.54, p <.001 (effect size, d = .85). However, both samples had similar levels of education. The Australian mean was 14.67 years (SD=3.34, Min=5, Max=25) and the US mean was 15.6 years (SD=2.9, Min= 8, Max=29) (effect size, d=.15*)*.

In the Australian sample, the proportions of participants who had attained school up to year 10 was 10%, to year 12 was 23%, a trade was 13%, an undergraduate degree was 29%, and a postgraduate degree was 25%. Most respondents indicated they were in an intimate relationship (78%), 13% indicated they were single, 8% were separated, divorced or widowed. In relation to the socio-economic status of the sample, the largest proportion was employed as professionals (39%). Retirees made up a further 14% of the sample and there was also some representation of unemployed, unpaid housekeeping, trades people, and labourers.

Over 40% of the sample indicated they were born in Australia and the reported mean time of residence was 49.29 years (SD=18.09 years, Min=18.71 years, Max=88.34 years). The mean number of years of residence in Australia of those born overseas was 23.10 years (SD=16.00 years, Min=4.50 years, Max=62.00 years). Most participants resided in Victoria (76%), 21% were from New South Wales and 3% from Queensland.

Distributions of the QOLI Total score

Comparison of the distributions of the Australian sample with the US-based standardization sample shows the raw scores throughout the Australian sample were slightly higher. However, the T-scores were only marginally higher in the Australian sample. Table 2 shows the distribution of the QOLI Total score compared with the US-based distribution reported in Frisch's (1994) standardization study.

Insert Table 2 about here

Although the differences in the distributions in Table 2 approached significance when compared using a one sample t-test, $t(258)=1.95$, $p=.054$. The effect size for this difference was small ($d=.12$). However, as expected, the sample was negatively skewed (skewness =-.71 and standard error of skew=.15) (Tabachnick & Fidell, 2001). As such, nonparametric analyses were used to compare the distributions. A Wilcoxon Signed-Ranks Test indicated a significant difference between the median of the US-based distribution and the Australian sample, $p<.001$. Revised classifications for the Australian sample are provided in Table 3.

Insert Table 3 about here

Table 3 shows the differences between the US and Australian distributions. The score to enter the High Range was very similar, being only marginally higher in the Australian sample. The main difference was that a slightly higher score is required to be classified as Average in the Australian sample.

Confirmatory factor analyses

The second aim of this study was to examine the fit of the Australian QOLI data to four separate factor structures identified from the literature. Each of these models had been established with confirmatory factor analyses in separate samples. Prior to undertaking this analysis, the distributions of the QOLI domains were examined and found to be negatively skewed. As such, a procedure that included bootstrapping for model comparison was adopted, as it is not based on the assumption of normality.

For each of the four structures, the mean discrepancy between implied moments obtained from the bootstrap sample and the moments from the bootstrap population was compared, with the lowest indicating the model with best fit (Arbuckle, 2007; Linhart and Zuchini, 1986). In addition, the hypothesized models were each tested using Chi square analysis. Table 4 shows the results of each of these analyses were significant. Whilst significance can indicate poor model fit, Ullman (2001) asserted that differences between sample and estimated population covariance matrices can give inaccurate results and suggestsed the use of a range of Goodness of Fit Indices. Multiple goodness of fit tests included the minimum discrepancy divided by degrees of freedom (CMIN/DF Ullman, 2001), the Comparative Fit Index (CFI, Bentler, 1988), and the Root Mean Squared Error of Approximation (RMSEA, Browne & Cudeck, 1993) and Aikake Information Criterion (AIC, Akaike, 1987) and Standardised Root Mean Square Residual (SRMR, Hu and Bentler, 1999).

Insert Table 4 about here

Table 4 shows three-factor model had best fit across the indices. Its factors were observed to be highly intercorrelated (.76 to .86), suggesting a large proportion of shared variance and prompted consideration of an equivalent model with a second order general factor denoting Overall Quality of Life[1]. This was considered to be more closely in line with the theoretical model underlying the measure. No differences were observed on fit indices for this model and it is shown in standardized form in Figure 1.

Insert Figure 1 about here

The QOLI was designed for use in the clinical context, in which QOLI ratings would likely change in relation to changes in clinical conditions and the efficacy of interventions. These changes could conceivably occur differentially between factors within specific populations, and so the psychometric properties of the unidimensional scale and also the three factors were examined separately as follows.

Reliability and validity of the QOLI in this Australian sample

Key psychometric properties of the three factor scores and also the unidimensional scale of the QOLI were examined in this Australian sample. These included internal consistency using Cronbach's alpha, and temporal stability using test-retest reliability coefficients. The median test-retest time interval in the present study was 14.00days (Mean=17.14, SD=7.91), which was comparable with Frisch's (1994) study (Mean 14.4days, SD=3.9days). Replicating the procedure undertaken in the US-based standardization study, convergent validity was examined using correlations with the Satisfaction with Life Scale (SWLS, Diener et al., 1985) and Quality of Life Index

[1] The authors would like to acknowledge this suggestion made by an AJP reviewer.

(QLI, Ferrans and Powers, 1985). Divergent validity was examined using correlational analyses, with scales measuring depression, anxiety and stress (DASS, Lovibond & Lovibond, 1995). Although the data was skewed, inspection of nonparametric correlations showed little difference compared with Pearson's correlations and so the latter were reported. Table 5 shows the results of these analyses, comparing results for the Australian sample with the US-based standardization sample.

Insert Table 5 about here

Overall, the QOLI's psychometric properties in the Australian sample were generally sound. Many of the coefficients approximated those reported by Frisch(1994) in the US standardization study. One area of weakness was in the internal consistency for each of the three factors of the QOLI, with alphas marginally less than .70. Cronbach's alpha is influenced by the number of items in the scale and so with only four items in QOLI Factors 1 and 2 and six in Factor 3, this was not surprising. The internal consistency of the unidimensional scale was quite acceptable.

The behavior of the QOLI in the Australian sample in relation to convergent and divergent validity was satisfactory and very similar to that reported in the US-based standardization study (Frisch, 1994).There was a moderate to strong relationship with the Satisfaction with Life Scale (SWLS) and Quality of Life Index (QLI). Inspection of correlations with the Depression Anxiety and Stress Scale (DASS), a well-established measure of psychological distress, were also as predicted, with inverse relationships with all scales. Moderate strength correlations were observed between QOLI Factor scores and the Depression scale with weaker relationships seen between the QOLI and the Anxiety and Stress scales.

As with any survey, it is best practice to check for response bias. Frisch(1994) reported a weak positive relationship between QOLI responses and Marlowe-Crowne SDS responses (see Table 5), indicating there was likely to be some bias in participants' responses towards presenting well. The items on the Marlowe-Crowne scale have been criticized for being somewhat dated. As such, the more recently developed SDS-17 (Stober, 2001) was selected for the present study as it had been shown to be strongly related to the Marlowe-Crowne SDS r=.85 (Stober, 2001). Table 4 shows there were no significant relationships between the SDS-17 and QOLI Factors or unidimensional scale score. Therefore, the data set in the present study was considered not to be confounded by this type of response bias.

Relationships between QOLI scores and demographic characteristics

Relationships between QOLI scores and key demographic variables were undertaken and compared with those reported in the US-based standardisation sample as follows:

- *Gender:* Independent samples t-tests showed no significant differences between gender groups on any of the QOLI Factor scores or the unidimensional score. This was consistent with Frisch's (1994) findings.
- *Age:* Weak relationships were identified between age and the QOLI unidimensional score r=.19, p<.01, and Factor 3: Family and Environment, r=.22, p<.05, although these were stronger than results reported by Frisch(1994), r=.04, p<.05.
- *Years of education:* Whilst Frisch(1994) reported a weak relationship between years of education and QOLI score, r=.10, p<.05, no significant relationships were identified between the number of years of schooling reported by

participants in the present study and any of the QOLI Factor scores or unidimensional score.

Discussion

The four aims of this study were: 1) to compare the distributions of ratings on the QOLI of an Australian general population sample with the US-based normative distribution published by Frisch(1994), 2) compare the fit of data from this local sample with four factor structures identified from the literature, 3) examine key psychometric properties of the QOLI in the Australian sample, and compare these results with the US-based standardization study (Frisch, 1994), and 4) examine the relationships between the QOLI in the Australian sample on key demographic variables.

In relation to the first aim, the results showed the Australian sample rated their quality of life slightly higher than the US-based standardisation sample. These differences may be clinically meaningful when applied to the scores denoting the clinical classification ranges. For example, the score at the bottom of the Average Range was just 0.30 higher than in the US-based sample (within a possible range of -6.00 to 6.00). Practically, this is a very small difference, which could be explained by general improvements in living conditions since the US-based standardization study was conducted in the early 1990s. Additionally, the Australian sample had a large proportion of participants with higher educational achievement, likely to have come from higher socio-economic backgrounds. While the differences between distributions may be statistically significant, in practice these differences appear minor.

The second aim was to compare the fit of data from an Australian general population sample with four factor structures identified from the literature. Results of the confirmatory factor analyses indicated that the three-factor model had best fit. This model was derived from our previous work in an Australian clinical sample (Thomas, Skilbeck and Slatyer (2009). Further, it was interesting to observe consistency between our results and the work of Lunney and Schnurr (2007), who found their data from male war veterans was a poor fit to the unidimensional model advanced by Frisch(1994) and Frisch and Sandford, (2003).

Although the three-factor model met the criteria for good fit, the covariances between the factors were quite strong. Similarly strong covariances were evident in our previous research with adults who had sustained traumatic brain injury,.69 to.83 (Thomas et al., 2009). We have noted the QOLI is intended for clinical use and found identical fit for an equivalent model with a general second order factor Overall Quality of Life.

Conceptually, it is important to note that quality of life is a product of various factors in an individual's life, rather than a latent characteristic causing variation in the scale variables. Use of a unidimensional model is consistent with this view. However, we believe there may be utility in using a multi-factor approach in monitoring patient outcomes and response to treatment. Future research could explore whether the factors are differentially sensitive to change in particular aspects of subjective quality of life in various clinical populations and contexts.

The present study examined the psychometric properties of the QOLI as a unidimensional scale and also as a three-factor scale. Table 4 showed that internal consistency was good for the unidimensional scale (α=.83), but marginal for the three factors (α=.63,.67,.68). It was noted that the small number of items in Factors 1

and 2 may have contributed to this. If future research supports the utility of a multifactorial structure for the QOLI, further work could investigate ways to increase the internal consistency of the factors.

The other psychometric properties of the QOLI Factor scores and unidimensional score were all similar to those reported by Frisch(1994) in the US-based standardization study. Temporal stability appeared sound over the period, for both the factor scores and unidimensional score, as did convergent validity with other measures of subjective quality of life. Additional evidence for construct validity was found in the strength of relationships with scales measuring depression, anxiety and stress. The results also indicated that participants' responses to the QOLI were uncontaminated by social desirability, as demonstrated in the null relationship between the Social Desirability Scale (SDS-17, Stober 2001) and the QOLI scores. This finding adds confidence to the use of the QOLI and findings of the present study.

Consistent with Frisch(1994), the present study found no significant relationships between gender and the three-factor or unidimensional QOLI scores. Older people tended to report higher quality of life as well as higher scores on QOLI Factor 3: Family and environment scores, suggesting that older participants rated greater satisfaction with their relationships and home environment. That only one factor score was found to relate to age also supports the suggestion that there may be utility in the multifactorial model for the QOLI. Overall, these findings add confidence in the use of the QOLI in the Australian context.

The present research was intended as a "check-norming study", to investigate whether the QOLI could be used with confidence in the Australian context. In keeping with the scope of this work, the present study utilised data from a

convenience sample of healthy community dwelling adults. As such, the sample could not be expected to be fully representative of the Australian community. Consistent with the scope of the study, efforts were made to stratify the sample by gender and age and there was adequate representation on these variables. One obvious limitation was that while there were participants in the sample that represented a variety of circumstances, a relatively large proportion was from more highly educated and higher socioeconomic status backgrounds. It may be that the higher scores in the Australian distribution are due to sampling bias towards participants from professional backgrounds. As such, the results should be interpreted with some caution.

In conclusion, the results of the present study suggest that the original norms provided by Frisch(1994) are likely to be appropriate for use in the current Australian context. Comparison of factor structures indicated a three-factor model as best fitting. The psychometric properties of the three QOLI Factors and unidimensional scale were generally sound and relationships with basic demographic variables were generally consistent with the results from the original standardization study in the US (Frisch, 1994). In order to determine the utility of this multi-factorial model, future research could examine the sensitivity and predictive validity of the scales in a range of clinical contexts.

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Table 1

Results of four confirmatory factor analysis studies of the QOLI

Study	Population	N	GFI	Factors and domains
Frisch & Sanford (2003)	University counselling centre	1 735	CFI =.96, RMSEA= .040	All domains load onto Life Satisfaction.
McAlinden & Oei (2006)	Anxiety and depression	217	CFI =.91, RMSEA = .078	1. Self oriented: Health, Self-esteem, Work, Goals and values, Learning, Create, Play,Helping. 2. Other: Friends, Neighbourhood, Community, Home, Children, Love, Money, Relatives
Thomas et al. (2009)	Pre-injury estimates following traumatic brain injury	235	CFI = .92, RMSEA = .060	1. Self-functioning and activity: Health, Self-esteem, Work, Goals and values. 2. Self-actualisation: Play, Learning Creativity, Helping. 3. Family and environment: Money, Love, Relatives, Home, Neighbourhood, Community
Lunney & Schnurr (2007)	PTSD in male war veterans	319	CFI = .92, RMSEA =.061	1. Achievement: Health, Self-esteem, Work, Goals and values, Money. 2. Self-expression: Play, Learning, Creativity. 3. Relationships: Helping, Love, Friends, Children, Relatives. 4. Surroundings: Home, Neighbourhood, Community

Note. Goodness of fit indices (GFI). Criteria for acceptable fit for the Comparative fit index (CFI) $\geq$ .90, and Root mean square error of approximation (RMSEA) $\leq$ .08.

Table 2

Table 2

Comparison of the Australian distribution and US-based normative sample

	Australian sample n=259		US-based sample (Frisch,1994) n=798	
	Raw	T-score	Raw	T-score
Mean	2.75	51.00	2.60	50.00
SD	1.25	-	1.30	10.00
75th percentile	3.56	57.00	3.40	57.00
Median	2.94	53.00	2.70	51.00
25th percentile	2.07	46.00	1.80	44.00
Minimum	-2.00	15.00	-3.88*	0.00
Maximum	5.47	72.00	5.88*	99.00
Skew	-.71	-	-	-
Std error	.15	-	-	-

Note. All T-scores are based on Frisch's (1994) US-based norms. *Taken from clinical samples provided by Frisch, Cornell, Villanueva and Retzlaff (1992).

Table 3

Comparison of Australian and US-based classification scores

QOL classification	Raw score ranges		
	Australian QOLI data	US QOLI data	Percentile range
High	3.70 to 6.00	3.60-6.00	81st – 99th
Average	1.90 to 3.60	1.60-3.50	21st – 80th
Low	1.00 to 1.80	0.90-1.50	11th – 20th
Very Low	-6.00 to 0.90	-6.00-0.80	1st – 10th

Table 4

Goodness of fit indices for the models

	Mean Discrepancy (S.E.)	CMIN/DF	CFI	RMSEA	AIC	SRMR
Fit if	Lowest	<2	>.90/>.95	<.08/<.05	Lowest	<.08/<.05
1 Factor	318.29 (.58)	2.48	.83	.076 (064-.088)	354.34	.064
2 Factor	297.70 (.59)	2.29	.85	.071 (.059-.082)	301.31	.064
3 Factor	***190.95 (.60)***	***1.75***	***.93***	***.054 (.038-.069)***	***191.72***	***.052***
4 Factor	261.87 (.66)	1.95	.90	.061 (.048-.074)	267.41	.059

Note. Bootstrap Mean Discrepancy (standard errors), RMSEA 90% confidence interval (lo–hi score), Lower fit criteria indicate adequate fit and higher criteria indicate good fit.

Table 5

Comparison of QOLI scores in the Australian sample with the US-based standardization sample

	QOLI-Factor 1	QOLI-Factor 2	QOLI-Factor 3	AUS-QOLI Total score	US-based Frisch(1994) Total score
Cronbach's *α*	.68	.67	.63	.83	.79
Test–retest *r*	.72**	.82**	.82**	.84**	.73**
SWLS	.52**	.38**	.49**	.58**	.56**
QLI	.66**	.58**	.59**	.74**	.75**
DASS-Dep	-.53**	-.38**	-.38**	-.54**	NA
DASS-Anx	-.27**	-.16**	-.10	-.23**	NA
DASS-Stress	-.30**	-.27**	-.24**	-.35**	NA
SDS	-.12	-.07	-.08	-.11	.25**

**p <.01. Satisfaction with Life Scale (SWLS), Quality of Life Inventory (QLI), Depression Anxiety and Stress Scale (DASS), Social Desirability Scale (SDS). Not available (NA)