Psycho-oncology Assessment in Chinese Populations: A Systematic Review of Quality of Life and Psychosocial Measures

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Abstract

This systematic review describes psychosocial and quality of life (QOL) measures used in psycho-oncology research with cancer patients and caregivers in China. Medline and PsycINFO databases were searched (1980-2014). Studies reviewed met the following criteria: English language; peer-reviewed; sampled Chinese cancer patients/caregivers; developed, validated or assessed psychometric properties of psychosocial or QOL outcome measures; and reported validation data. The review examined characteristics of measures and participants, translation and cultural adaptation processes and psychometric properties of the measures. Ninety five studies met review criteria. Common characteristics of studies reviewed were they: assessed primarily QOL measures, sampled patients with breast, colorectal, or head and neck cancer, and validated existing measures (>80%) originating in North America or Europe. Few studies reported difficulties translating measures. Regarding psychometric properties of the measures >50% of studies reported subscale reliabilities <α=0.70, <50% reported test-retest reliability, and <30% reported divergent validity. Few reported sensitivity, specificity or responsiveness. Improved accuracy and transparency of reporting for translation, cultural adaptation and psychometric testing of psychosocial measures is needed. Developing support structures for translating and validating psychosocial measures would enable this and ensure Chinese psycho-oncology clinical practice and research keeps pace with international focus on patient reported outcome measures and data management.

Keywords: psycho-oncology; China; psychometrics; validation; psychosocial; quality of life.

Introduction

Approximately 87% of all deaths in China are now attributable to non-communicable diseases, with cancer as a leading cause of death second only to cardiovascular disease (World Health Organization., 2014). The burden of cancer and other non-communicable diseases will continue to rise in parallel with China's rapidly ageing population; increased prevalence of health-risk factors including smoking, alcohol consumption, hypertension and obesity; and continued exposure to environmental risk factors such as air pollution (Goss et al., 2014; S. Tang, Ehiri, & Long, 2013; World Health Organization., 2014). In 2012, the age-standardised incidence rate for cancer in Chinese men and women combined was 174.0 per 100,000 population corresponding to an estimated 3,065,400 of new cases of cancer diagnosed. In that same year, over 2.2 million people died from cancer with an age-standardised mortality rate of 122.2 per 100,000 population. The five-year prevalence for the adult population in China was estimated to be 5,045,000, representing a crude rate of 456.0 adults per 100,000 diagnosed with cancer (International Agency for Research in Cancer., 2014). Lung, stomach, liver, colorectal, and oesophageal were the five most common cancers in China in 2012. Lung cancer was the most common cancer for males (25.2%) and females (15.6%). As well for males, other frequent cancers were liver cancer (16.1%), stomach cancer (15.6%), cancer of the oesophagus (8.8%) and colorectal cancer (8.0%). For females, additional common cancers were breast cancer (15.1%), stomach cancer (9.8%), colorectal cancer (8.6%) and liver cancer (8.2%) (International Agency for Research in Cancer., 2014).

The diagnosis and treatment of cancer is a major life stress for patients, their partners and families, and is associated with well described physical and psychosocial difficulties which can occur across the disease trajectory and may persist into survivorship (Chambers, Girgis, et al., 2012; Pitceathly & Maguire, 2003; Zabora, Brintzenhofeszoc, Curbow, Hooker, & Piantadosi, 2001). Approximately one third of patients with cancer in Western contexts experience ongoing clinically significant distress including anxiety and depression, adjustment disorders, fears about cancer recurrence, and post-traumatic stress reactions, which may worsen over time (Stein, Syrjala, & Andrykowski, 2008; Zabora et al., 2001). Increasingly, psychosocial difficulties associated with

cancer diagnosis, treatment and survivorship are also a focus in Chinese cancer care settings (Grassi & Watson, 2012; L. Tang, de Groot, & Bultz, 2009), and Chinese psycho-oncology descriptive (Chambers et al., 2013) and intervention research (Tao, Jiang, Liu, Aungsuroch, & Tao, 2014). High prevalence of anxiety (49.7%) and depression (54.9%) in Chinese patients with cancer has been reported in meta-analysis (Y. L. Yang et al., 2013) with variations in psychological morbidity by tumour site identified in cross-sectional studies (Hong & Tian, 2014; L. Zhao et al., 2014). Psycho-oncologic interventions including nurse- or therapist-delivered education, psychotherapy, coping skills or relaxation training (or a combination of these) also appear effective in reducing anxiety and depression in Chinese patients despite limitations in study design, measurement and reporting (Tao et al., 2014).

Although this evidence is promising, establishing psycho-oncology as a core component of cancer care and research in China presents challenges for clinicians and researchers. These challenges include cultural (e.g., non-disclosure of diagnosis, beliefs about illness, stigma), systemic (e.g., low value placed on psychological care, psycho-oncology as unscientific) and individual (e.g., lack of awareness of psychosocial issues) barriers which may impact detection, intervention and treatment of psychosocial difficulties experienced by patients and their families (L. Tang et al., 2009; Y. L. Yang et al., 2013). The availability of culturally appropriate, validated psycho-oncology assessment and screening tools is critical to meet these challenges not only to identify the psychosocial needs of cancer patients and families but also to build an evidence base for the prevalence and impact of psychosocial issues; evaluate the effectiveness of interventions; and facilitate cross-cultural comparisons in clinical trials and descriptive research (Jacobsen & Donovan, 2012). Accordingly, the overarching aim of this review was to identify and describe at a broad level the psychosocial and quality of life measures for assessment of cancer patients or their caregivers in China for which validation data exists (broad review). A second aim was to focus specifically on the psychometric properties of validated measures which assess the psychosocial burden of cancer for patients in China (focused review). It is envisaged that results of this review will serve as a resource and identify gaps in knowledge to help inform researchers and clinicians using measures in this setting.

Methods

Search strategy

Medline and PsycINFO (via Ovid) databases were searched (1980– Week 1, April, 2014). Search terms were derived from prior systematic reviews on measurement in psycho-oncology (Minton & Stone, 2008; Pearce, Sanson-Fisher, & Campbell, 2008) or systematic (Chambers et al., 2013; Chambers, Hyde, Ip, Dunn, & Gardiner, 2012) and other reviews (Zeng, Ching, & Loke, 2010) on psycho-oncology in Asia and included the following:

1. (cancer.mp OR neoplasm$.mp OR metastasis$.mp OR malignan$.mp OR exp neoplasms/)
2. (psychological.mp OR psychosocial.mp OR well-being.mp OR coping.mp OR anxiety.mp OR depression.mp OR distress.mp OR survivor$.mp OR pain OR fatigue.mp OR exp quality of life/ OR exp emotional adjustment/ OR exp social adjustment)
3. (scale$.mp OR validation.mp OR psychometric$.mp OR exp measurement/ OR exp psychometrics/ OR exp test validity/ OR exp test construction/)
4. (China.mp OR Chinese.mp OR Taiwan$.mp OR Hong Kong.mp OR Macau.mp)
5. 1 AND 2 AND 3 AND 4

Duplicates were removed prior to examination of article titles and abstracts. Further focussed searches with the terms ‘Chinese’ and ‘cancer’ and the names of scales commonly used in psycho-oncology to assess psychological distress (e.g., Distress Thermometer, Hospital Anxiety and Depression Scale), general (e.g., SF-36) and cancer-specific quality of life (e.g., EORTC, FACT) were conducted on Google Scholar to supplement electronic database searches (Gehanno, Rollin, & Darmoni, 2013). Cited references searches for relevant articles were conducted using Web of Science and Google Scholar. Reference lists of articles which met final inclusion criteria were also searched by hand.

Inclusion criteria

Potentially relevant articles were identified by examining the title and abstract and then retrieved for more detailed evaluation against the a priori inclusion criteria by two authors and a research assistant. Any variation in inclusion/exclusion decisions was discussed until consensus was

reached. Studies described in peer-reviewed journal articles and published in English language were included if they met the following pre-determined criteria:

- At least 70% were adult patients who had/have cancer and/or were partners or caregivers of cancer patients.
- Sample recruitment occurred in China, Taiwan or Hong Kong.
- Study focus was on developing or validating a measure or examining its psychometric properties and included validation data (reliability and/or validity).
- Study included a measure to assess a psychosocial outcome (e.g., psychological distress, psychological adjustment, and social adjustment) or a quality of life outcome (including fatigue, pain and sleep).

Data extraction

One author and a research assistant separately reviewed the articles which met final inclusion criteria. A table defining the psychometric properties of interest for the review was created prior to the search process (Table 1) (based on (Clinton-McHarg, Carey, Sanson-Fisher, Shakeshaft, & Rainbird, 2010; Fayers & Machin, 2007; Minton & Stone, 2008). Beaton and colleague's process recommendations outline five key stages which were used to guide description of cross-cultural adaptation of measures included in the review: forward translation, synthesis, back translation, expert review, and pre-testing (summarised in Table 2) (Beaton, Bombardier, Guillemin, & Ferraz, 2000; Guillemin, Bombardier, & Beaton, 1993). Key characteristics of validated measures were extracted based on a standardised form developed by the authors prior to the search process and included:

- ***Measure characteristics***: name, country of origin, number of items, author, year.
- ***Sample characteristics***: location, sample size, age in years, sex, and type of cancer.
- ***Cultural adaptation process*** for measures that were not newly developed: translation (forward, back), synthesis, expert review and pre-testing.
- ***Psychometric properties*** of the measure: internal consistency, test-retest reliability, convergent validity, divergent validity, known-groups (clinical) validity, sensitivity, specificity, and responsiveness.

Characteristics of included studies were summarised in tables by one author and verified independently by a second author (Tables 3 and 4). The review and subsequent reporting of results were guided by the PRISMA statement (Moher, Liberati, Tetzlaff, & Altman, 2009). Ethical approval was not required.

Results

Characteristics of studies included in the broad review

Search results

The process of identifying relevant articles for the review is outlined in Figure 1. The Medline and PsycINFO database search, Google Scholar searches, cited references search and reference lists searched by hand identified 613 articles. Of these 67 were English only abstracts (i.e. Chinese language full-text) and were subsequently excluded. On examination of titles and abstracts, 397 published English language studies were potentially relevant and after checking against inclusion criteria 107 were retrieved for further evaluation. After full-text review, 12 articles were excluded because they either did not include a psychosocial or quality of life outcome or validation data. Thus, a total of 95 instrument validation articles met inclusion criteria and were retained for the broader review.

Study focus, location and temporal trends

Regarding study focus, 67 validated a quality of life measure (including 2 sleep; 8 fatigue; and 4 pain) and 28 a psychosocial measure (including 13 psychological distress; 12 other psychosocial; and 3 unmet needs). Most articles described studies that were conducted in China (n = 39) and Taiwan (n = 30), followed by Hong Kong (n = 24) with two cross-regional studies (Hong Kong and Taiwan). Quality of life instruments were validated more often than other measures regardless of region, with comparatively less validation of measures overall in Hong Kong (26 out of 95 studies) (Table 5). Instrument validation articles increased over time, with over 85% occurring since 2004.

Sample characteristics

Patients. Studies included in the review sampled predominantly patients (n = 90). Sample sizes ranged from 64 to 1108 (Median = 224) with patient age ranging from 42.2 to 70.6 years (M = 53.77 years). The proportion of males and females across samples was approximately evenly distributed with an average of 48.9% and 51.2%, respectively. The most common cancer types represented in instrument validation studies focused on a specific cancer type (n = 63) were breast (22.2%), colorectal (19.0%), head and neck (19.0%), lung (12.7%), and gynaecological (9.5%). Approximately one-third (31.5%) did not focus on a specific cancer type. Figure 3 displays the number of instrument validation studies for each cancer type according to region.

Caregivers. Five articles focussed on caregivers and were conducted primarily in Taiwan (n = 3). Validated instruments assessed quality of life (n = 2), psychological distress (n = 2), or other psychosocial measures (n = 1). Sample sizes ranged from 132 to 400 (Median = 183) with caregivers ranging in age from 35.1 to 42.8 years (M = 40.9 years). The average proportion of females sampled across studies (70.4%) was larger than the proportion of males (29.6%). Of studies reporting the relationship between caregivers and cancer patients, caregivers were predominantly spouses or parents. The main patient cancer type was Leukaemia (cancer type was not reported in two studies).

Cultural adaptation

Most studies (82.5%) validated established psychosocial or quality of life (including sleep, fatigue, and pain) measures. Of these, 58.8% undertook the recommended steps for translation and cultural adaptation of self-report measures (Table 2; (Beaton et al., 2000; Guillemin et al., 1993)) or followed pre-specified guidelines for quality of life measures (EORTC or FACIT); 16.2% reported the translation process only; and 25% did not report a translation or cultural adaptation process. By contrast, 17.5% developed new instruments and these represented predominantly quality of life (e.g., QLICP system) and other psychosocial (e.g., social adjustment, sense of coherence) measures. Regarding country of origin, studies most commonly validated measures originating in either North America (USA and Canada; n = 43, 45.2%) or Europe (n = 22, 23.1%). The remaining studies validated measures originating in China (n = 10, 10.5%), Hong Kong (n = 5, 5.2%), Taiwan (n = 3,

3.2%), UK (n = 4, 4.2%), Australia (n = 3, 3.2%), Japan (n = 1, 1.1%), Israel (n = 1, 1.1%) or multiple countries (n = 3, 3.2%).

Reliability

Internal consistency. As detailed in Tables 3 and 4, 37 (40.2%) studies reported acceptable reliability based on a Cronbach's alpha coefficient above the recommended guidelines for group comparison (α > 0.70; Table 1), while 4 studies did not report internal consistency. Over half (n = 51, 55.4%) described one or more subscales with internal consistency below α 0.70. For instance, 11 studies validating EORTC-QLQ core or breast, gastric, head and neck, and lung cancer specific modules in China or Taiwan identified the cognitive functioning domain as having poor internal consistency (range α 0.30 to 0.58) (J. X. Cheng et al., 2011; Chie, Chang, Huang, & Kuo, 2003; Chie, Hong, Lai, Ting, & Hsu, 2003; Chie, Yang, Hsu, & Yang, 2004; C.-C. Huang, Lien, Sung, Liu, & Chie, 2007; C. Wan et al., 2008; C. Wan, X. Tang, et al., 2007; C. Wan, C. Zhang, et al., 2008; L. Zhang et al., 2014; H. Zhao & Kanda, 2000, 2004). As well, in studies validating EORTC-QLQ colorectal, ovarian or prostate cancer specific modules, chemotherapy side effects (range α 0.44 to 0.63) (Chie, Lan, Chiang, & Chen, 2010; Kong et al., 2012; Law et al., 2008) and/or treatment related symptoms (range α 0.39 to 0.45) (Y. Chang et al., 2012; W-C. Chie, C-Y. Lan, et al., 2010; Chie, Yu, & Yu, 2010) domains were identified as problematic in 5 studies. Regarding developed measures, 8 studies validating the System of Quality of Life Instruments for Cancer Patients general and cancer specific modules described low internal consistency for the social function domain (range α 0.53 to 0.68) (Gu et al., 2009; Meng et al., 2008a; C. Wan et al., 2010; C. Wan, Y. Lu, et al., 2008; C. Wan, Z. Yang, et al., 2008; C. Wan et al., 2009; Xu et al., 2012; Z. Yang, Luo, et al., 2012).

Test-retest reliability. Forty-six studies (48.4%) examined test-retest reliability. Test-retest time frame ranged from 1 day to 4 months (median 2 to 3 days; mode 1 to 3 days). Consistent with recommendations, the majority described good test-retest reliability with intra class correlation coefficients or Pearson's r ranging from 0.73 to 0.97 (Table 2). Seventeen studies validating quality of life measures reported sub-optimal test-retest reliability on one or more subscales (ICC or Pearson's r range 0.19 to 0.69) (J. X. Cheng et al., 2011; K. K. Cheng, Wong, Ling, Chan, &

Thompson, 2009; W-C. Chie et al., 2003; W-C. Chie et al., 2003; Chie et al., 2004; Fong et al., 2014; Ge et al., 2011; L. Hu et al., 2014; Kong et al., 2012; Pien et al., 2011; Tian & Hong, 2012; Tzeng, Fu, & Lin, 2012; C. Wan, Y. Lu, et al., 2008; C. Wan, X. Tang, et al., 2007; C. Wan, C. Zhang, et al., 2008; C. K. Wong et al., 2012; Yeung, Shiu, Martin, & Chu, 2006).

Validity

The majority of studies provided some evidence of validity (92.6%) while 7 studies did not describe the methods undertaken to assess validity. 72 studies provided evidence of convergent/criterion validity by describing the degree to which the validated measure correlated with other similar measures (including 'gold standard' measures), while 25 studies did not. Overall, the most common criterion measures were the Chinese versions of the Hospital Anxiety and Depression Scale (HADS) (n = 17), the Short Form 36 Health Survey (SF-36) (n = 10), and the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire Core Module (EORTC-QLQ-C30) (n = 6). Comparatively fewer studies examined divergent validity by reporting correlations between the validated measure and other measures from which it would be expected to differ (n = 26); 72.6% of studies did not provide this information. Overall, the most common measures used to assess divergent validity were the Chinese versions of the Life Orientation Test-Revised (n = 5); the Rosenberg self-esteem scale (n = 4); the HADS (n = 3) and the Herth Hope Index (n = 3).

Information regarding sensitivity and specificity of validated measures was reported in 9 studies, with 27 studies describing the responsiveness of the measure for detecting change in scores over time. Known-groups comparisons were conducted in 48 instrument validation studies (i.e. known groups/clinical validity). Overall, studies commonly discriminated groups on the basis of their performance or functional status (Eastern Cooperative Oncology Group-Performance Status Rating, Karnofsky Performance Status Index scores) (n = 18); type of treatment (n = 12); and stage of treatment (n = 12).

Characteristics of studies included in the focused review on psychosocial measures

Search results for psychosocial measures

In line with the second aim of this review, the review focus was narrowed to consider instrument validation for assessment of the psychosocial burden associated with cancer for patients. For the purposes of this review, the term psychosocial encompassed psychological, social or unmet needs (Pirl, 2010). Thus, as a final step articles describing quality of life measures or measures for caregivers were excluded, leaving 25 articles validating psychosocial measures for patients in China. Of these, 11 studies validated measures of psychological distress including the Courtauld Emotional Control Scale, Distress Thermometer, Hospital Anxiety and Depression Scale, Illness Intrusiveness Ratings Scale, Impact of Event Scale, Mini-Mental Adjustment to Cancer scale, and the Mood and Anxiety Symptom Questionnaire - Short Form; 11 validated other psychosocial measures such as the Cataldo Lung Cancer Stigma Scale, Decisional Conflict Scale, Posttraumatic Growth Inventory, Resilience Scale-14, Sense of Coherence Scale and the Social Relational Quality Scale; and 3 validated measures of unmet needs including the Supportive Care Needs Survey – Short Form. Table 6 provides more detailed information on the psychometric properties of these measures and domains assessed.

Sample characteristics for psychosocial measures

Studies validating psychosocial measures were conducted in China (n = 9), Hong Kong (n = 9) and Taiwan (n = 6) with one cross-regional study in Hong Kong and Taiwan. Sample sizes ranged from 85 to 1029 (Median = 279) with patients aged from 42.8 to 65.7 years (M = 52.48 years). The proportion of males (48.1%) and females (51.9%) across samples was relatively evenly distributed. Breast and colorectal cancer were the most common cancer types represented in 36% and 12% of studies, respectively. Sixteen percent did not focus on a specific cancer type.

Cultural adaptation of psychosocial measures

Approximately half of the 25 psychosocial measures were based on established instruments originating predominantly in North America (n = 13, 52%). Twelve studies validating psychosocial measures followed recommended guidelines for translation and cultural adaptation; 3 reported the

translation process only; 6 did not report a translation or cultural adaptation process; and 4 were newly developed measures. Studies were also examined for author reports on difficulties experienced in achieving conceptual or semantic equivalence of translated measures. Of the studies reporting a translation process, 5 did not make reference to any difficulties in the translation of measures (S.-C. Chen, Lai, Liao, & Lin, 2005; S. M. Ho, C. L. Chan, & R. T. Ho, 2004; S. M. Ho et al., 2013; G.-L. Wang et al., 2011; W. T. Wang, Tu, Liu, Yeh, & Hsu, 2013); 2 explicitly reported that their participants experienced no difficulty responding to the translated version (S.-C. Chen, Lai, Cheng, Liao, & Chang, 2011; R. T. Ho, C. L. Chan, & S. M. Ho, 2004); 5 indicated there may have been difficulty in achieving equivalence between translated and back-translated versions but did not identify particular items (Au et al., 2011; S. M. Ho, Kam Fung, Chan, Watson, & Tsui, 2003; Hou, Lam, Law, Fu, & Fielding, 2009; W. W. T. Lam et al., 2012; Tian & Hong, 2013); and 3 identified modifications made to specific items to ensure semantic or conceptual equivalence (W. Li et al., 2011; Y. Wang, Zou, Jiang, Wei, & Jiang, 2013; Q. Yang, Liu, Yang, Ji, & Li, 2014). For example, Wang and colleagues identified difficulty with translation of the word 'distress' and reported 'xinlitongku' as the specific Chinese term chosen to represent distress (Y. Wang et al., 2013).

Reliability for psychosocial measures

Twelve (54.5%) studies demonstrated acceptable internal consistency with Cronbach's alpha coefficients exceeding 0.70; 9 (40.1%) reported poor internal consistency for one or more subscales; and one study did not report a Cronbach's alpha coefficient (Table 6). In both studies validating the Mini-Mental Adjustment to Cancer scale, cognitive avoidance demonstrated lower than recommended reliability (α 0.65, S. M. Ho et al., 2003; α 0.56, W. T. Wang et al., 2013). As well, the Post-Traumatic Growth Inventory had low internal consistency for subscales, although the total scale reliability was sufficient (S. M. Ho et al., 2004; S. M. Ho et al., 2013). Regarding stability of the psychosocial measures, 6 studies (24%) examined test-retest reliability with a test-retest time frame ranging from 3 days to 4 months (Median 7 to 21 days). All studies described good test-retest reliability (ICC or $r \geq 0.80$).

Validity for psychosocial measures

All except two psychosocial studies provided some evidence of validity (Table 6). Specifically, 23 studies validated measures for psychological distress, other psychosocial aspects, or unmet needs and described convergent/criterion validity. The HADS was the most common criterion measure for psychosocial instruments, used in 15 of 23 studies. As well, the HADS and LOT-R were more frequently used as comparison measures in 5 of 9 studies describing divergent validity data.

The sensitivity and specificity of psychosocial instruments was described in 7 studies validating Chinese versions of the Distress Thermometer (n = 5), HADS (n = 1), or Resilience Scale-14 (n = 1). Regarding the Distress Thermometer, sensitivity ranged from 0.42 to 0.98 and specificity from 0.70 to 0.85. A cut-off score of 4 or 5 was recommended as optimal for screening for distress in Chinese patients with cancer. Two studies reported positive predictive values >0.60 and negative predictive values > 0.85. One study described responsiveness of the distress thermometer from the beginning to end of treatment. For the HADS, one study reported sensitivity of 0.84 and specificity of 0.68 with an optimal cut-off score of 15. Sensitivity (0.74) and specificity (0.71) of the Chinese Resilience Scale-14 was also reported with a cut-off score of 64 identified as optimal. Known-groups validity was described in 8 studies validating measures for other psychosocial aspects (n = 5) or unmet needs (n = 3) with groups most commonly differentiated on the basis of age or type of treatment.

Discussion

The number of published, peer-reviewed psycho-oncology instrument validation studies conducted in Chinese cancer patient and caregiver populations focused on quality of life increased steadily over time from 1996 to 2014. By comparison, validation of psychosocial instruments occurred predominantly from 2009, with a focus on measures of psychological distress increasing from 2011. These findings may reflect broader trends in cancer research and practice. Specifically, the greater focus on validation of quality of life measures may be attributed to the proliferation of quality of life research more broadly and the availability of structured guidelines and systems to support translation of quality of life measures. In this regard, the European Organisation for Research

and Treatment of Cancer (EORTC) Quality of Life Group Translation Procedure (Dewolf et al., 2009) and the Functional Assessment of Chronic Illness Therapy Translation Services (FACITtrans) (Functional Assessment of Chronic Illness Therapy Organisation., 2010) based in North America are key examples. In contrast, no parallel structure or support exists for translation of psychosocial measures and it remains to be seen whether the recent focus in research and clinical practice on patient reported outcomes and associated frameworks (e.g., PROMS; Black & Jenkinson, 2009; Roberts et al., 2012) will remedy this gap.

In 2010, the International Psycho-Oncology Society (IPOS) developed an International Standard of Quality Cancer Care for integration of the psychosocial domain into routine cancer care and recognition of distress as the 6th vital sign following temperature, blood pressure, pulse, respiration and pain (Holland, Watson, & Dunn, 2011). Subsequent endorsement of this standard by the Union for International Cancer Control (UICC) and the mandate for cancer care organisations worldwide to incorporate distress screening as a routine part of cancer care has drawn focus internationally on not only the importance of psychosocial care of cancer patients, but also the need for validated gold standard measures to assess distress (Holland et al., 2011; Jacobsen & Donovan, 2012). The increased validation of psychological distress measures in Chinese psycho-oncology patient populations since 2011 may be explained at least in part by these developments.

Instrument validation studies for specific cancer types identified in this review focused more often on breast cancer, followed by colorectal and head and neck cancer. While this trend concurs with psycho-oncology reviews in both Western (Sanson-Fisher, et al., 2009) and Chinese (Chambers et al., 2013) contexts where breast cancer has consistently attracted more research attention, it suggests a gap in validation or translation of measures that match current and estimated future cancer incidence and mortality rates; a trend that is evident worldwide and not unique to China. Based on rates of cancer incidence and mortality in China (International Agency for Research in Cancer., 2014), more research attention needs to be directed towards the development and validation of lung, liver and stomach cancer instruments for patients. As well, prostate cancer has been identified as an emerging priority in Asia and China specifically with evidence for increased prostate cancer incidence and mortality (Baade, Youlden, Cramb, Dunn, & Gardiner, 2013; Center et al., 2012). However, only two

studies on prostate cancer-specific instruments were identified in this review. A focus on men with prostate cancer and validation of relevant measures to assess their psychosocial well-being and quality of life is needed (see also Chambers et al., 2013).

Most studies included in the current review provided some evidence of reliability and/or validity however this was not universally consistent. Reported internal consistency for sub-scales in over half of the studies reviewed was below the recommended guidelines of $\alpha \geq 0.70$ (Bland & Altman, 1997). In this regard, a consistently low Cronbach's alpha for the cognitive function subscale derived from the EORTC Quality of Life measure (EORTC-QLQ-C30) was identified as a recurrent trend in this review. Although a previous review of health-related quality of life measures in other settings noted that the two-item cognitive functioning scale from the EORTC-QLQ-C30 most often demonstrated Cronbach's alpha below 0.70 (Luckett et al., 2011), it is unclear whether the poor internal consistency of this measure in Chinese cancer patient populations is similarly due to the low number of items; cultural inappropriateness of the scale; or other factors including research group or research settings. Less than half of all studies reviewed examined test-retest reliability and when psychosocial measures were considered specifically, less than 25% of these studies provided this information. Quality of life and psychosocial outcome measures are routinely used in psycho-oncology clinical trials, intervention and descriptive research and the lack of evidence supporting temporal stability of the measures reviewed is problematic.

In demonstrating validity, the studies reviewed more often provided evidence for convergent/criterion validity; over 70% did not provide information about divergent validity. The HADS was commonly used as the 'gold standard' measure for validation of quality of life and psychosocial measures. However, of all the studies included in this review only one validated the HADS with cancer patients in China and this study did not provide information regarding reliability or the cultural adaptation process (G.-L. Wang et al., 2011). Measures may perform differently in different settings and it is therefore critical for these measures to be tested and validated for use in the intended target population (Jacobsen & Donovan, 2012), in this case cancer patients in China. Moreover, as the most widely used self-report measure of psychological or emotional distress in cancer care settings internationally, the HADS has well-described inconsistencies in its latent

structure, with variations in this structure dependent upon the statistical methods utilised (Cosco, Doyle, Ward, & McGee, 2012). Thus, additional research appears warranted to validate the HADS in Chinese cancer care settings and determine suitability of the measure before further application. Consistent with prior reviews on quality of life measures (Clinton-McHarg et al., 2010; Pearce et al., 2008), few studies in the current review provided information regarding sensitivity, specificity or responsiveness for the measures validated.

Instrument validation studies in this review were based predominantly on measures originating in North America or Europe with few reporting development of novel measures for use in China. Approximately half of the studies reviewed (excluding those following EORTC or FACIT guidelines) undertook all recommended steps for translation and cultural adaptation of measures (Beaton et al., 2000; Guillemin et al., 1993). Regarding psychosocial measures specifically, only three studies identified difficulties experienced in translating items and described subsequent modifications to achieve conceptual or semantic equivalence. It is unclear whether it is truly the case that few difficulties were experienced or whether the authors of instrument validation studies were not aware of or did not report these difficulties. This finding concurs with a prior study in which few concerns were expressed by researchers using a translated version of the HADS despite issues with the measure identified in the broader literature (e.g., factor structure; use of colloquialisms) (Maters, Sanderman, Kim, & Coyne, 2013). Failure to observe or underreporting of cultural adaptation of measures can draw into question the validity of a scale (is it measuring what it is designed to measure?) and impact scale means, factor structure, and cut-off values as well as diminishing the possibility for comparison with studies of similar focus or inclusion in reviews or meta-analysis (Coyne & van Sonderen, 2012; Maters et al., 2013). Given these implications, there is an urgent need for greater transparency and accuracy of reporting regarding the translation and cultural adaptation of measures in psycho-oncology instrument validation studies and research in China and elsewhere.

Limitations

This review is limited in three main ways. First, the focus on English language, full-text journal articles, does not capture existing studies reported only in Chinese language. In this regard, 18 of the 67 excluded studies with English language only abstracts potentially met review criteria. These

studies examined psychometric properties of three psychological distress, three other psychosocial, one fatigue and 11 quality of life measures (Table 7), almost half (44.4%) of which appear to be developed measures. Second, there were clear gaps in validation studies in specific Chinese regions where scales measuring sleep (China, Hong Kong), unmet needs (China), fatigue (Hong Kong) and pain (Hong Kong) were either not captured by this review or have not been validated with cancer patients (Table 5). More broadly, missing or non-reported psychometric information combined with most measures having been validated in only one study resulted in the absence of a collective body of validation work for quality of life and psychosocial measures, precluded accurate and evidence-based conclusions about measures which are most optimal, should not be recommended for use, or require further development. Third, it was beyond the scope of this review to examine all types of validity. Instead our focus was limited to convergent, divergent, and known groups (clinical) validity consistent with the types of validity covered in prior psychometric reviews (Minton & Stone, 2008; Ojo et al., 2012).

Conclusion

As the first systematic review of psychosocial and quality of life instrument validation studies for Chinese cancer patients and caregivers, this review serves as a resource and identifies gaps in knowledge to assist researchers and clinicians using psycho-oncology assessment in China. Specifically, findings of this review suggest three key areas for continued development in China and elsewhere: 1) validation of measures that reflect priority cancer types indicated by Chinese cancer incidence and mortality rates; 2) appropriate support and structure for translation of psychosocial measures, perhaps under the guidance or sponsorship of leading international bodies such as the International Psycho-Oncology Society (IPOS; International Psycho-Oncology Society., 2013); and 3) greater frequency, accuracy and transparency in reporting of information about reliability, validity, translation and cultural adaptation processes in quality of life and psychosocial instrument validation studies. Such development aligns with the trend towards increased international focus on patient reported outcome measures (Acquadro, Conway, Hareendran, & Aaronson, 2008; Q. Li, Lin, Liu, &

Xu, 2014); data pooling and creation of data repositories; and the need for harmonisation to support these methods (Acquadro et al., 2008; Riley, Lambert, & Abo-Zaid, 2010; Wild et al., 2005).

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Table 1

Definitions of psychometric properties for the review

Psychometric property	Definition
Reliability	
Internal consistency	Degree to which items in a scale correlate with each other or the total score (Cronbach's α recommended ≥0.70 for group comparisons and ≥0.90 for individual comparisons; (Bland & Altman, 1997).
Test-retest reliability	Degree to which the measure provides consistent scores when administered to the same population under the same conditions (e.g. setting) over time (Intra-class correlation co-efficient recommended or Pearson's $r \geq 0.70$ for group comparisons and ≥ 0.90 for individual comparisons (Lohr, 2002). Recommended second test 2 days to 4 weeks (Marx, Menezes, Horovitz, Jones, & Warren, 2003; Switzer, Wisniewski, Belle, Dew, & Schultz, 1999).
Validity	
Convergent/Criterion validity	Degree to which a measure correlates with other measures (preferably 'gold' standard) with which it shares overlap (Pearson's *r* recommended ≥0.40 (Clinton-McHarg et al., 2010).
Divergent validity	Degree to which a measure correlates with other measures from which it is expected to differ (Pearson's *r* recommended ≤0.30; Clinton-McHarg et al., 2010).
Known-groups validity (also clinical validity)	Ability of a measure to discriminate between groups of people who are expected to score differently on a measure (e.g., patients on-off treatment).
Sensitivity	Ability of measure to detect the condition, outcome or behaviour of interest in the population studied.
Specificity	Ability of a measure to correctly discern between people who do and do not have a condition, outcome or behaviour of interest in the population studied.
Responsiveness	ability of a measure to detect change in a condition, outcome or behaviour of interest (e.g., levels of distress or health status)

Derived from Clinton-McHarg et al. (2010); Fayers & Machin (2007); Minton & Stone (2008); Shum, O'Gorman, Myors, and Creed (2013)

Table 2

Guidelines for cross-cultural adaptation of self-report measures adapted for the review

Stage	Description
Forward translation	Translation of the measure from original (English) to target (Chinese) language. *Recommended:* Minimum of two translations conducted by bilingual translators whose first language is the target language. First translator should be aware of and familiar with outcome assessed; Second translator should be blind to outcome assessed.
Synthesis	Translations synthesised to produce one translation with consensus agreement.
Backward translation	Translations of the measure from target (Chinese) to original (English) language. *Recommended:* Minimum of two backward translations conducted by bilingual translators with English as a first language. Both translators are blind to outcome assessed.
Expert review	Review by a panel or expert committee to check for item equivalence between the translated and original measure (e.g., semantics) and reach consensus on a final draft translation of the measure.
Pre-testing/Piloting	Pre-testing or piloting of the measure with target group (e.g., patients with cancer) and ideally checking participant understanding of items. *Recommended*: 30-40 participants included in this stage.

Adapted from Beaton et al. (2000) and Guillemin et al. (1993)

Table 3

Patient - Measure characteristics, cultural adaptation process, psychometric properties and associated sample characteristics

Measure (Abbreviation) *Country of Origin*	Items	Source	Sample characteristics					Cultural adaptation process	Reliability		Validity
			Location	N	Age in yrs M (SD)	Sex (%)	Cancer type (%)		α	Test-retest (ICC, *r*)	
Psychological Distress											
Courtauld Emotional Control Scale (CECS); *UK*	21	R.T. Ho et al. (2004)	Hong Kong	139	49.3 (8.4)	F (100)	Breast (64)	Forward, back	≥ 0.74; total 0.92	NR	✓
Distress Thermometer (DT) + Problem List (PL); *USA*	1	Y. Deng, Zhong, & Jian (2014)	China	295	46.7 (10.5)	M (72.2) F (27.8)	Nasopharyngeal	NR	N/A	NR	✓
	DT 1 PL 36	Y. Wang et al. (2013)	China	323	45.0 (16.2)	M (67.5) F (32.5)	Lymphoma (Non-Hodgkin) (86.7)	Forward, back, review, pilot	N/A	NR	✓
	1	Hong & Tian (2013)	China	442	46.4 (10.7)	M (72) F (28)	Nasopharyngeal	NR	N/A	NR	✓
	DT 1 PL 40	L-L. Tang, Zhang, Pang, Zhang, & Song (2011)	China	574	55.0 (14)	M (46.2) F (53.8)	Mixed	NR	N/A	r 0.80	✓
	DT 1 PL 34	G-L. Wang et al. (2011)	Taiwan	103	48.0 (11.9)	M (20) F (80)	Breast (44)	Forward, synthesis, back, review, pilot	N/A	NR	✓
Hospital Anxiety and Depression Scale (HADS); *UK*	14	G-L. Wang et al. (2011)	Taiwan	103	48.0 (11.9)	M (20) F (80)	Breast (44)	NR	NR	NR	✓
Illness Intrusiveness Ratings Scale (IIRS); *Canada*	13	W. Li et al. (2011)	China	641	55.9	M (45.2) F (54.8)	Mixed	Forward, review	≥ 0.75; total 0.92	NR	✓
Impact of Event Scale (IES); *USA*	15	S-C. Chen et al. (2005)	Taiwan	106	53.6 (11.7)	M (84.9) F (15.1)	Oral	Forward, back, review, pilot	≥ 0.81; total 0.91	α 0.97	✓
Mini-Mental Adjustment to Cancer (Mini-Mac); *UK*	29	S.M. Ho et al. (2003)	Hong Kong	115	NR	M (37.4) F (62.6)	Mixed	Forward, synthesis, back, review	≥ 0.65	NR	✓
	27	W.T. Wang et al. (2013)	Taiwan	340	47.3 to 52.1 (7.9 to 8.8)	F (100)	Breast	Phrases modified, review	≥ 0.51	NR	✓
Mood and Anxiety Symptom Questionnaire-Short Form (MASQ-SF); *USA*	46	G. Deng, Jiang, & Li (2012)	China	1029	56.6 (5.7)	M (53) F (47)	Pancreatic	NR	≥ 0.79; total 0.88	r 0.80	✓
Other Psychosocial											
Cancer Experience and Efficacy Scale (CEES); *Hong Kong*	29	Hou (2010)	Hong Kong	215	64.3 (10.6)	M (62) F (38)	Colorectal	N/A	≥ 0.79	NR	✓
Cataldo Lung Cancer Stigma Scale (CLCSS); *USA*	38	Q. Yang et al. (2014)	China	117	58.0 (3.2)	M (73.5) F (26.5)	Lung	Forward, back, review, pilot	≥ 0.60; total 0.88	α ≥ 0.60; total α 0.88	✓
Chinese Cancer Coherence Scale (CCCS); *Hong Kong*	11	Chan, Ho, & Chan (2007) Study 1	Hong Kong	190	49.3 (8.3)	F (100)	Breast	N/A	≥ 0.86	r ≥ 0.87	✓
Chinese Social Adjustment Scale (CSAS); *Hong Kong*	33	Fielding & Lam (2004) Study 2	Hong Kong	367	51.8 (11.1)	F (100)	Breast	N/A	≥ 0.63	NR	✓
Decisional Conflict Scale (DCS);	14	W.W.T. Lam	Hong Kong	471	54.4 (9.9)	F (100)	Breast	Forward, back,	≥ 0.51; total	NR	✓

Measure (Abbreviation) *Country of Origin*	Items	Source	Sample characteristics					Cultural adaptation process	Reliability		Validity
			Location	N	Age in yrs M (SD)	Sex (%)	Cancer type (%)		α	Test-retest (ICC, *r*)	
Canada		et al. (2012)						review	0.81		
Posttraumatic Growth Inventory (PTGI); *USA*	15	S.M. Ho et al. (2004)	Hong Kong	188	49.3 (0.6)	M (17) F (83)	Breast (53.7)	Forward, back	≥ 0.43; total 0.83	NR	✓
	15	S.M. Ho et al. (2013)	Taiwan	440	48.4 (8.5)	M (5.9) F (94.1)	Breast (82.5)	Forward, back	≥ 0.51; total 0.86	NR	NR
Resilience Scale (RS)-14; *USA*	14	Tian & Hong (2013) Study 2	China	970	51.3 (12.8)	M (51.1) F (48.9)	Mixed	Forward, back, review	≥ 0.82; total 0.93	NR	✓
Sense of Coherence Scale (SOC-13); *Israel*	13	Yan Ding, Bao, Xu, Hu, & Hallberg (2012)	China	238	42.8 (8.6)	F (100)	Cervical	NR	≥ 0.43; total 0.82	NR	✓
Social Relational Quality Scale (SRQS); *Hong Kong*	17	Hou et al. (2009)	Hong Kong	234	64.4 (10.6)	M (62) F (38)	Colorectal	Forward, back, review, pilot	≥ 0.75	NR	✓
Spiritual Distress Scale (SDS); *Taiwan*	30	Ku, Kuo, & Yao (2010)	Taiwan	85	45.9 (15.1)	M (67.1) F (32.9)	NR	N/A	≥ 0.90; total 0.95	NR	NR
Unmet Needs											
Cancer Needs Questionnaire Short Form-Head and Neck (CNQ-SF-HN); *Australia*	36	S-C. Chen et al. (2011)	Taiwan	206	50.6 (11.3)	M (93.7) F (6.3)	Oral cavity	Forward, back, review, pilot	≥ 0.85; total 0.97	ICC 0.80	✓
Supportive Care Needs Survey – Short Form (SCNS-SF34); *Australia*	33	Au et al. (2011)	Hong Kong	348	53.7 (9.9)	F (100)	Breast	Forward, back, review	≥ 0.75	NR	✓
	34	W.W.Y. Li et al. (2013)	Hong Kong, Taiwan	[HK] 360 [T] 263	[HK] 65.7 (11.1); [T] 58.4 (11.2)	[HK] M (63) F(37); [T] M (57) F (43)	Colorectal	NR	[HK] ≥ 0.53; [T] ≥ 0.76	NR	✓
Sleep											
Athens Insomnia Scale (AIS); *Greece*	8	Sun, Chiou, & Lin (2011)	Taiwan	195	56.7 (13.3)	M (40.5) F (59.5)	Mixed	Forward, back, synthesis	total 0.83	r 0.91	✓
Pittsburgh Sleep Quality Index (PSQI); *USA*	19	Tzeng et al. (2012)	Taiwan	205	58.4 (14.7)	M (63.9) F (34.1)	Mixed (Metastatic disease; 43)	NR	≥ 0.79	r 0.59-0.89; r 0.91 total	✓
Fatigue											
Brief Fatigue Inventory (BFI); *USA*	9	X.S. Wang, Hao, et al. (2004)	China	249	51.0	M (46) F (54)	Mixed	Forward, back, synthesis	≥ 0.90	NR	✓
	9	C-C. Lin et al. (2006)	Taiwan	439	58.7 (13.7)	M (44) F (57)	Mixed	Forward, back, synthesis	≥ 0.95	r ≥ 0.89	✓
Cancer Fatigue Scale (CFS); *Japan*	15	Shun, Beck, Frost et al. (2007); Shun et al. (2006); Shun, Beck, Pett et al. (2007)	Taiwan	243	51.4	M (46) F (54)	Mixed	Forward, synthesis, back, review	total 0.83	total α 0.88	✓
Fatigue Symptom Inventory (FSI); *USA*	14	Shun, Beck, Frost et al. (2007); Shun et al. (2006); Shun, Beck,	Taiwan	243	51.4	M (46) F (54)	Mixed	Forward, synthesis, back, review	total 0.92	total α 0.95	✓

Measure (Abbreviation) *Country of Origin*	Items	Source	Sample characteristics					Cultural adaptation process	Reliability		Validity
			Location	N	Age in yrs M (SD)	Sex (%)	Cancer type (%)		α	Test-retest (ICC, *r*)	
		Pett et al. (2007)									
International Statistical Classification of Diseases and Related Health Problems for Cancer Related Fatigue (ICD-10 CRF); *USA, Belgium*	14	E-T. Yeh et al. (2011)	Taiwan	265	NR	M (36) F (64)	Mixed	Forward, back, review, pilot	total 0.84	NR	NR
Multidimensional Fatigue Inventory (MFI)-20; *Netherlands*	20	Tian & Hong (2012)	China	385	53.2 (12.9)	M (51.4) F (48.6)	Mixed	Forward, back, synthesis	≥ 0.70; total 0.87	total α 0.82; r 0.19-0.26	✓
Multidimensional Fatigue Symptom Inventory-Short Form (MFSI-SF); *USA*	30	Pien et al. (2011)	Taiwan	107	53.4 (11.0)	M (34.6) F (65.4)	Mixed	Forward, back, review, pilot	> 0.80; 0.90 total	ICC 0.40-0.66	✓
Schwartz Cancer Fatigue Scale-revised (SCFS-r); *USA*	6	Shun, Beck, Frost et al. (2007); Shun et al. (2006); Shun, Beck, Pett et al. (2007)	Taiwan	243	51.4	M (46) F (54)	Mixed	Forward, synthesis, back, review	total 0.82	total α 0.92	✓
Pain											
Brief Pain Inventory (BPI); *USA*	11	X.S. Wang, Mendoza, Gao, & Cleeland (1996)	China	147	54.0	M (58) F (42)	Mixed	Forward, back, synthesis	> 0.89	NR	✓
	11	Ger et al. (1999)	Taiwan	534	55.1 (15.1)	M (64) F (36)	Mixed	Forward, back, review	> 0.81	ICC 0.79-0.81	✓
Multidimensional Pain Inventory-Screening (MPI-s); *USA*	8	Lai et al. (2009)	Taiwan	106	58.4 (15.4)	M (53.8) F (46.2)	Mixed	Forward, back, review, pilot	≥ 0.47; total 0.75	NR	✓
Perceived Meanings of Cancer Pain Inventory (PMCPI); *Taiwan*	27	M-L. Chen (1999)	Taiwan	203	NR	M (53.5) F (46.5)	Mixed	N/A	≥ 0.56	NR	NR
Quality of Life											
EORTC QLQ-Core Questionnaire (C30); *Europe**	30	J.X. Cheng et al. (2011)	China	308	Med: 45.6	M (50.3) F (49.7)	Brain tumour	NR	≥ 0.33	r 0.27-0.79	NR
	30	C. Wan et al. (2008)	China	600	52.4 (12.6)	M (50.5) F (49.5)	Mixed	NR	≥ 0.49	ICC ≥ 0.75	✓
	30	H. Zhao & Kanda (2004)	China	143	45.9 to 55.5 (10.4 to 11.5)	NR	Mixed	NR	≥ 0.49	r's > 0.80	✓
	30	H. Zhao & Kanda (2000)	Taiwan	191	42.2 (14.3)	F (100)	Ovarian (55)	Forward, synthesis, back, review, pilot	≥ 0.45	NR	NR
Breast (BR23)	53	C. Wan, X. Tang, et al. (2007)	China	233	48.6 (9.92)	F (100)	Breast	EORTC guidelines	≥ 0.41	r ≥ 0.65	✓
	53	W-C. Chie et al. (2003)	Taiwan	89	NR	F (100)	Breast	EORTC guidelines	≥ 0.53	ICC ≥ 0.66	✓
Cervical (CX24)	54	Hua et al. (2013)	China	115	44.8 (9)	F (100)	Cervical	NR	≥ 0.71	NR	✓
Colorectal (CR38)	68	Kong et al.	China	110	55.8 (11.4)	M (62.7) F	Colorectal	EORTC guidelines	≥ 0.44	ICC ≥ 0.51	✓

Measure (Abbreviation) *Country of Origin*	Items	Source	Sample characteristics					Cultural adaptation process	Reliability		Validity
			Location	N	Age in yrs M (SD)	Sex (%)	Cancer type (%)		α	Test-retest (ICC, *r*)	
		(2012)				(37.3)					
	68	Law et al. (2008)	Hong Kong	256	59.0 (9.8)	M (66) F (34)	Colorectal	NR	≥ 0.47	NR	✓
Gastric (STO22)	52	C-C. Huang et al. (2007)	Taiwan	100	62.7 (13.6) to 65.0 (11.6)	M:F 21:15 to 29:35	Gastric	EORTC guidelines	≥ 0.30	NR	✓
Head and Neck (H&N35)	65	Z. Yang, Meng, et al. (2012)	China	133	52.0 (15.4)	M (73.7) F (26.3)	Head & neck	EORTC guidelines	≥ 0.71	ICC ≥ 0.88	✓
	65	Bower et al. (2009)	Hong Kong	119	Med 61.0	M:F 3:1	Head & neck	EORTC guidelines	≥ 0.35	NR	✓
	65	W-C. Chie et al. (2003)	Taiwan	100	NR	M (76) F (24)	Nasopharyngeal	EORTC guidelines	≥ 0.51	ICC 0.33-0.82	✓
Lung Cancer (LC13)	43	L. Zhang et al. (2014)	China	317	59.2 (10.3)	M (60.4) F (39.6)	Lung	NR	≥ 0.41	NR	✓
	43	C.H. Wan, C. Zhang, et al. (2008)	China	181	56.4 (11.2)	M (87.8) F (12.2)	Lung	EORTC guidelines	≥ 0.32	r 0.53- 0.80	✓
	43	Chie et al. (2004)	Taiwan	99	54.3 to 55 (12.1 to 12.4)	Approx. M (56) F (43)	Lung	EORTC guidelines	≥ 0.58	ICC 0.46-0.85	✓
Oesophageal (OES18)	48	Chie, Tsai, Chiang, & Lee (2010)	Taiwan	95	60.0 (12)	NR	Oesophageal	EORTC guidelines	≥ 0.67	NR	✓
Ovarian (OV28)	55	W-C. Chie, C-Y. Lan, et al. (2010)	Taiwan	96	54.0 (12)	F (100)	Ovarian	EORTC guidelines	≥ 0.39	NR	✓
Prostate (PR25)	55	Y. Chang et al. (2012)	Taiwan	135	70.6 (7.3)	M (100)	Prostate	NR	≥ 0.41	NR	NR
	55	W-C. Chie et al. (2010)	Taiwan	81	NR	M (100)	Prostate	EORTC guidelines	≥ 0.41	NR	✓
EuroQol Questionnaire (EQ-5D) + Visual Analogue Scale (VAS); *England, Finland, Netherlands, Norway, Sweden**	EQ 5 VAS 1	Lang, Chuang, Shun, Hsieh, & Lan (2010)	Taiwan	530	56.1 (12.1)	F (100)	Cervical	NR	NR	ICC 0.83	✓
FACT-General (G); *USA*	29	Yu et al. (2000)	Hong Kong	*S1* 1108 *S2* 141	*S1* 55.8 (13.5) *S2* 52.7 (12.3)	*S1* M (60) F (40) *S2* M (58) F (42)	Mixed	Forward, synthesis, back, review, pilot	≥ 0.37; total 0.85	NR	✓
Bone Marrow Transplant (BMT)	37	Lau et al. (2002)	Hong Kong	134	NR	M (56.7) F (43.3)	Leukaemia	FACT guidelines	≥ 0.71; total 0.92	NR	✓
Breast (B)	36	C. Wan, D. Zhang, et al. (2007)	China	376	48.3 (9.74)	F (100)	Breast	FACT guidelines	≥ 0.59	r's >0.8	✓
Colorectal (C)	36	C.K. Wong et al. (2013)	Hong Kong	391	61.2 – 66 (10.8-12)	M (59.6-61.5) F (40.4-	Colorectal	NR	NR	NR	NR

Measure (Abbreviation) *Country of Origin*	Items	Source	Sample characteristics					Cultural adaptation process	Reliability		Validity
			Location	N	Age in yrs M (SD)	Sex (%)	Cancer type (%)		α	Test-retest (ICC, *r*)	
						38.5)					
	36	C.K. Wong et al. (2012)	Hong Kong	536	63.9 (11.2)	M (58.2) F (41.8)	Colorectal	FACT guidelines, pilot	≥ 0.68; total > 0.90	ICC ≥ 0.60	✓
Cervix (Cx)	42	Y. Ding, Hu, & Hallberg (2012)	China	400	42.6 (8.1)	F (100)	Cervical	Translated by CORE, review	≥ 0.57; total 0.88	NR	✓
Head and Neck (H&N)	36	J. Chang et al. (2008)	Taiwan	203	Med 52.5 (12.4)	M (78) F (23)	Head & neck	FACT guidelines	≥ 0.72; 0.91 total	NR	✓
Lung (L)	34	C. Wan, C. Zhang, et al. (2007)	China	181	56.4 (11.2)	M (87.8) F (12.2)	Lung	FACT guidelines	≥ 0.56	r's > 0.75	✓
Nasopharyngeal (NP)	43	Tong et al. (2009)	Hong Kong	357	51.2	M (74.5) F (25.2)	Nasopharyngeal	N/A	≥ 0.84; total 0.95	ICC 0.73-0.88; r 0.90 total	✓
Functional Living Index-Cancer (FLIC); *Canada*	22	Fong et al. (2014)	Hong Kong	500	49.0 to 50.2 (10.2 to 9.8)	M (37.2) F (62.8)	Mixed	Forward, synthesis, back, review	≥ 0.68; total 0.92	ICC ≥ 0.67; total 0.83	✓
Gastrointestinal Quality of Life Index (GQIQLI); *Germany, Canada**	36	Yeung et al. (2006)	Hong Kong	140	65.2 (12.8)	M (63) F (37)	Gastric	Forward, back, review, pilot	≥ 0.66	ICC 0.47-0.80	✓
McGill Quality of Life Questionnaire (MQOL); *Canada*	16	L. Hu et al. (2014)	China	126	48.9 (15.8)	M (55.6) F (44.4)	Thoracic (41.3)	Forward, back, synthesis	≥ 0.62	r's > 0.5	NR
	19	R. Lo et al. (2001)	Hong Kong	462	61.5 (14.5)	M (53) F (47)	Mixed	Forward, synthesis, back, review, pilot	≥ 0.68; total 0.83	ICC 0.85	✓
	16	W-Y. Hu, Dai, Berry, & Chiu (2003)	Taiwan	64	47.8 (16.2)	M (62.5) F (37.5)	Mixed	Forward, synthesis, back, review	≥ 0.69; total 0.83	NR	✓
M. D. Anderson Symptom Inventory (MDASI); *USA*	13	X.S. Wang, Wang, et al. (2004)	China	249	Med 51.0	M (46) F (54)	Mixed	Forward, back, synthesis	≥ 0.84	NR	✓
	13	C. Lin, Chang, Cleeland, Mendoza, & Wang (2007)	Taiwan	556	60.4 (13.3)	M (55) F (45)	Mixed	Forward, back, synthesis	≥ 0.89	r ≥ 0.96	✓
M. D. Anderson Symptom Assessment Inventory-Traditional Chinese Medicine Symptoms Evaluation Scale (MDASI-TCM); *China*	23	X.S. Wang (2007)	China	340	49.0	M (55) F (45)	Mixed	NR	≥ 0.78; total 0.90	NR	NR
Memorial Symptom Assessment Scale (MSAS); *USA*	32	K.K. Cheng et al. (2009)	Hong Kong	370	54.2 (11.9)	M (47.8) F (52.2)	Mixed	Forward, back, review, pilot	≥ 0.79	ICC 0.68-0.79	✓
	32	W.W.T. Lam et al. (2008)	Hong Kong	256	59.0 (9.8)	M (66) F (44)	Colorectal	Forward, synthesis, back	≥ 0.84	NR	✓
Condensed Memorial Symptom Assessment Scale (CMSAS); *USA*	14	W.W.T. Lam et al. (2008)	Hong Kong	256	59.0 (9.8)	M (66) F (44)	Colorectal	Forward, synthesis, back	≥ 0.79	NR	✓
Quality of Life Assessment System for Lung Cancer based on Traditional Chinese Medicine (QLASTCM-LU); *China*	46	C. Wan et al. (2012)	China	240	60.3 (10.2)	M (65) F (35)	Lung	N/A	≥ 0.85	ICC 0.93-0.96	✓

Measure (Abbreviation) *Country of Origin*	Items	Source	Sample characteristics					Cultural adaptation process	Reliability		Validity
			Location	N	Age in yrs M (SD)	Sex (%)	Cancer type (%)		α	Test-retest (ICC, *r*)	
QLICP-General Module (GM); *China*	32	C. Wan, Zheng Yang, et al. (2008)	China	600	52.4 (12.6)	M (50.5) F (49.5)	Mixed	N/A	≥ 0.61; total 0.88	r ≥0.84	✓
Breast Cancer (BR)	39	C. Wan et al. (2009)	China	186	48.5 (10.1)	F (100)	Breast	N/A	≥ 0.58	ICC > 0.75	✓
Colorectal Cancer (CR)	46	Xu et al. (2012)	China	110	55.8 (11.3)	M (62.7) F (37.3)	Colorectal	N/A	≥ 0.63; total 0.89	ICC's > 0.79	✓
Head and Neck Cancer (HN)	46	Z. Yang, Luo, et al. (2012)	China	133	52.0 (15.4)	M (73.7) F (26.3)	Head & neck	N/A	≥ 0.65; total 0.82	ICC's ≥ 0.86; total 0.97	✓
Lung Cancer (LU)	40	C. Wan, Y. Lu, et al. (2008)	China	85	57.0 (11.4)	M (92.9) F (7.1)	Lung	N/A	≥ 0.53	r 0.69- 0.87	✓
Stomach Cancer (ST)	39	Meng et al. (2008a)	China	86	52.7 (13.1)	M (66) F (34)	Stomach	N/A	≥ 0.67; total 0.91	r's > 0.9	✓
Quality of Life Instrument for Patients with Liver Cancer (QOL-LC); *China*	22	C. Wan et al. (2010)	China	105	47.5 (12.7)	M (88.6) F (11.4)	Liver	N/A	≥ 0.68	ICC's ≥ 0.70; total 0.83	✓
Quality of Life for Nasopharyngeal Carcinoma (QOL-NPC); *China*	30	Gu et al. (2009)	China	433	Med 45.0	M (74.4) F (25.6)	Nasopharyngeal	N/A	≥ 0.64	NR	NR
Quality of Life Radiation Therapy Instrument-Head and Neck (QOL-RTI-H&N); *USA*	39	P.S. Lo et al. (2004)	Hong Kong	138	NR	M (80.4) F (19.6)	Head & neck	Forward, back, review, pilot	≥ 0.58	ICC 0.75-0.89	✓
Short-Form 6 Dimensions (SF-6D); *USA*$	7	C.K. Wong, Mulhern, Wan, & Lam (2014)	Hong Kong	386	64.2 (11.2)	M (54.4) F (45.6)	Colorectal	NR	NR	NR	✓

EORTC QLQ = European Organization for Research and Treatment of Cancer Quality of Life Questionnaire; FACT = Functional Assessment of Cancer Therapy; QLICP = Quality of Life Instruments for Cancer Patients; F = Female; HK = Hong Kong; ICC = Intra-class correlation coefficient; M = Male; N/A = Not applicable (developed measure); NR = details not reported in article; ns = Not significant; SD = Standard Deviation; T = Taiwan; ✓= Evidence of validity; * = developed simultaneously in multiple countries; $ = Classification derived from Medical Outcomes Study Short Form 36.

Table 4

Caregiver - Measure characteristics, cultural adaptation process, psychometric properties and associated sample characteristics

Measure	Items	Source	Sample characteristics					Cultural adaptation process	Reliability		Validity
			Language/ Location	N	Age in yrs M (SD)	Sex (%)	Patient cancer type (%)		α	Test-retest	
Psychological Distress											
Parenting Stress Index (PSI); *USA*	15	C-H. Yeh, Chen, Li, & Chuang (2001)	Taiwan	149	35.1 to 36.6 (5.1 to 5.5)	M (32.9) F (67.1)	Leukaemia (59.1)	Modified wording, pilot	≥ 0.80	NR	NR
Psychological Well-being Scale (PWS); *Hong Kong*	11	Wu, Cho, Li, Chen, & Tse (2009)	Hong Kong	132	NR	NR	NR	N/A	≥ 0.63	NR	✓
Other Psychosocial											
Parental Coping Strategy Inventory (PCSI); *Taiwan*	48	C-H. Yeh (2001)	Taiwan	183	39.1 (6.3)	F (100)	Leukaemia (50.3)	N/A	≥ 0.69	NR	NR
Quality of Life											
Caregiver Reaction Assessment (CRA); *USA*	24	Ge et al. (2011)	China	400	46.6 (12.0)	M (48.7) F (51.3)	Leukaemia (40.1)	NR	≥ 0.66; total 0.71	ICC's 0.63-0.95	✓
Caregiver Quality of Life Index-Cancer-Mandarin (CQOLC-M); *USA*	35	W-R. Tang, Tang, & Kao (2009)	Taiwan	359	42.8 (13.6)	M (36.8) F (63.2)	NR	Forward, synthesis, back, review	≥ 0.28; 0.87 total	NR	✓

F = Female; ICC = Intra-class correlation coefficient; M = Male; N/A = Not applicable (developed measure); NR = details not reported in article; SD = Standard Deviation; ✓= Evidence of validity.

Table 5

Instrument validation focus in Chinese regions

	China	Taiwan	Hong Kong
Psychological Distress	• DT + PL • IIRS • MASQ-SF	• DT + PL • HADS • IES • Mini-MAC • PSI	• CECS • Mini-MAC • PWS
Other Psychosocial	• CLCSS • RS14 • SOC-13	• PTGI • SDS • PCSI	• CEES • CCCS • CSAS • PTGI • SRQS • DCS
Unmet Needs		• CNQ-SF-HN • SCNS-SF34	• SCNS-SF34
Sleep		• AIS • PSQI	
Fatigue	• BFI • MFI-20	• BFI • CFS • FSI • ICD-10 CRF • MFSI-SF • SCFS-r	
Pain	• BPI	• BPI • MPI-s • PMCPI	

Quality of Life	• CRA
	• EORTC QLQ30
	  ○ BR23
	  ○ CR38
	  ○ CX24
	  ○ H&N35
	  ○ LC13
	  ○ STO22
	• FACT-B
	• FACT-Cx
	• FACT-L
	• MDASI
	• MDASI-TCM
	• MQOL
	• QLASTCM-LU
	• QLICP-General Module
	  ○ BR
	  ○ CR
	  ○ HN
	  ○ LU
	  ○ ST
	• QOL-LC
	• QOL-NPC
		• CQOLC
		• EORTC QLQ30
		  ○ BR23
		  ○ H&N35
		  ○ LC13
		  ○ OES18
		  ○ OV28
		  ○ PR25
		• EQ-5D + VAS
		• FACT-H&N
		• MQOL
		• MDASI
			• EORTC QLQ30
			  ○ CR38
			  ○ H&N35
			• FACT- General Module
			  ○ BMT
			  ○ C
			  ○ NP
			• FLIC
			• GQIQLI
			• MQOL
			• MSAS (+ condensed version)
			• QOL-RTI/H&N
			• SF-6D

Psychological Distress: CECS = Courtauld Emotional Control Scale; DT = Distress Thermometer; HADS = Hospital Anxiety and Depression Scale; IES = Impact of Event Scale; IIRS = Illness Intrusiveness Ratings Scale; MASQ-SF = Mood and Anxiety Symptom Questionnaire-Short Form; Mini-MAC = Mini-Mental Adjustment to Cancer; PL = Problem List; PSI = Parenting Stress Index; PWS = Psychological Well-being Scale.

Other Psychosocial: CCCS = Chinese Cancer Coherence Scale; CEES = Chinese Experience and Efficacy Scale; CLCSS = Cataldo Lung Cancer Stigma Scale; CSAS = Chinese Social Adjustment Scale; DCS = Decisional Conflict Scale; PCSI = Parental Coping Strategy Index; PTGI = Post-Traumatic Growth Inventory; RS-14 = Resilience Scale-14; SDS = Spiritual Distress Scale; SOC-13 = Sense of Coherence Scale; SRQS = Social Relational Quality Scale.

Unmet Needs: CNQ-SF-HN = Cancer Needs Questionnaire Short Form-Head and Neck; SCNS-SF34 = Supportive Care Needs Survey – Short Form.

Sleep: AIS = Athens Insomnia Scale (AIS); PSQI = Pittsburgh Sleep Quality Index.

Fatigue: BFI = Brief Fatigue Inventory; CFS = Cancer Fatigue Scale; ICD-10-CRF = International Statistical Classification of Diseases and Related Health Problems for Cancer Related Fatigue; MFI-20 = Multidimensional Fatigue Inventory; MFSI-SF = Multidimensional Fatigue Symptom Inventory-Short Form; SCFS-r = Schwartz Cancer Fatigue Scale-revised.

Pain: MPI-s = Multidimensional Pain Inventory-Screening; PMCPI = Perceived Meanings of Cancer Pain Inventory.

QOL/HRQOL: CRA = Caregiver Reaction Assessment; CQOLC = Caregiver Quality of Life Index – Cancer; EORTC QLQ30 = European Organization for Research and Treatment of Cancer Quality of Life Questionnaire; EQ-5D = EuroQol Questionnaire; FACT = Functional Assessment of Cancer Therapy; FLIC = Functional Living Index-Cancer; FSI = Fatigue Symptom Inventory; GQIQLI = Gastrointestinal Quality of Life Index; MDASI = M. D. Anderson Symptom Inventory; MSAS = Memorial Symptom Assessment Scale; MQOL = McGill Quality of Life Questionnaire; QLASTCM-LU = Quality of Life Assessment System for Lung Cancer based on Traditional Chinese Medicine; QLICP = Quality of Life Instruments for Cancer Patients; QOL = Quality of Life Instrument for Patients with Cancer; QOL-RTI/H&N = Quality of Life Instrument for Patients with Cancer-Radiation Therapy Instrument – Head and Neck; SF-6D = Short Form Six Dimensions; TCM = Traditional Chinese Medicine; VAS = Visual Analogue Scale.

Table 6

Psychometric properties of psychosocial measures described in instrument validation studies

Measure (Abbreviation) *Country of Origin*	Items	Domain/sub-scale names	Reliability		Convergent/ Criterion[a]	Divergent[a]	Known groups	Sensitivity/ Specificity	Responsive-ness	Location	Source
			α	Test-retest (ICC, *r*)							
Psychological Distress											
Courtauld Emotional Control Scale (CECS); *UK*	21	Control of anger; Control of anxiety; Control of depression	≥ 0.74; total 0.92	NR	CECS & **HADS**, PSS, **Mini-Mac** negative emotion r's = 0.30 to 0.36	NR	NR	NR	NR	Hong Kong	R.T. Ho et al. (2004)
Distress Thermometer (DT) + Problem List (PL); *USA*	1	Distress	N/A	NR	**HADS** (r's NR)	NR	NR	**Sensitivity:** 0.73 **Specificity:** 0.85 **PPV:** 0.69 **NPV:** 0.87 **Optimal cut-off:** 4	✓	China	Y. Deng et al. (2014)
	DT 1 PL 36	DT: Distress; PL: Practical; Physical; Family; Emotional; Spiritual/religious	N/A	NR	**HADS** Total r = 0.82; HADS Depression r = 0.76; HADS Anxiety r = 0.74	NR	NR	**Sensitivity:** 0.87 **Specificity:** 0.76 **PPV:** 0.64 **NPV:** 0.92 **Optimal cut-off:** 5	NR	China	Y. Wang et al. (2013)
	1	Distress	N/A	NR	**HADS** (r's NR)	NR	NR	**Sensitivity:** 0.42 **Specificity:** 0.85 **PPV:** NR **NPV:** NR **Optimal cut-off:** 4	NR	China	Hong & Tian (2013)
	DT 1 PL 40	DT: Distress; PL: Practical; Physical; Family; Emotional; Spiritual/religious	N/A	r 0.80	**HADS**, SCL90, MiNi-International Neuropsychiatric Interview	NR	NR	**Sensitivity:** 0.80 **Specificity:** 0.70 **PPV:** NR **NPV:** NR **Optimal cut-off:** 4	NR	China	L-L. Tang et al. (2011)
	DT 1 PL 34	DT: Distress; PL: Practical; Physical; Family; Emotional; Spiritual/religious	N/A	NR	**HADS**	NR	NR	**Sensitivity:** 0.98 **Specificity:** 0.73 **PPV:** NR **NPV:** NR	NR	Taiwan	G-L. Wang et al. (2011)

Measure (Abbreviation) ***Country of Origin***	**Items**	**Domain/sub-scale names**	**Reliability**		**Convergent/ Criterion[a]**	**Divergent[a]**	**Known groups**	**Sensitivity/ Specificity**	**Responsive-ness**	**Location**	**Source**
			α	**Test-retest (ICC, *r*)**							
								Optimal cut-off: 4			
Hospital Anxiety and Depression Scale (HADS); *UK*	14	Anxiety; Depression	NR	NR	**DT**	NR	NR	**Sensitivity:** 0.84 **Specificity:** 0.68 **Optimal cut-off:** 15	NR	Taiwan	G-L. Wang et al. (2011)
Illness Intrusiveness Ratings Scale (IIRS); *Canada*	13	Health and living; Relationships and personal development	≥ 0.75; total 0.92	NR	**EORTC-QLQ-C30** r = 0.50	NR	NR	NR	NR	China	W. Li et al. (2011)
Impact of Event Scale (IES); *USA*	15	Intrusion; Avoidance	≥ 0.81; total 0.91	α 0.97	**HADS** r's 0.50 to 0.65	NR	NR	NR	NR	Taiwan	S-C. Chen et al. (2005)
Mini-Mental Adjustment to Cancer (Mini-Mac); *UK*	29	Negative emotion; Positive attitude; Cognitive avoidance	≥ 0.65	NR	Mini-Mac Negative emotion & **HADS** r's = 0.66 to 0.71	Mini-Mac Positive attitude & **HADS** r's = -0.12 to -0.26	NR	NR	NR	Hong Kong	S.M. Ho et al. (2003)
	27	Helplessness/ Hopelessness; Anxious Preoccupation; Fighting Spirit; Fatalism; Cognitive Avoidance	≥ 0.51	NR	**HADS** Depression – subscales (not Fighting Spirit) r's = 0.19 to 0.55; HADS Anxiety – subscales (not Fighting Spirit) r's = 0.23 to 0.63	**HADS** Depression – Fighting Spirit (Active stage) r ≥ -0.26	NR	NR	NR	Taiwan	W.T. Wang et al. (2013)
Mood and Anxiety Symptom Questionnaire-Short Form (MASQ-SF); *USA*	46	Anxiety Arousal; Anhedonic Depression; General Distress	≥ 0.79; total 0.88	r 0.80	**CES-D** r's = .46 to .72; **STAI-S** r's = .46 to .73	NR	NR	NR	NR	China	G. Deng et al. (2012)
Other Psychosocial											
Cancer Experience and Efficacy Scale (CEES); *Hong Kong - Developed measure*	29	Personal strain; Socioeconomic strain; Emotional strain; Personal efficacy; Collective efficacy; Proxy efficacy	≥ 0.79	NR	CEES-Efficacy & **LOT-R, HS** r's = 0.02 to 0.43; CEES-Efficacy (collective) & **SRQS** r's = 0.33 to 0.41; CEES-Efficacy (personal) & SRQS	CEES-Experience & **LOT-R, HS** r's = -0.10 to -0.33	Age, treatment stage, treatment type	NR	NR	Hong Kong	Hou (2010)

Measure (Abbreviation) *Country of Origin*	Items	Domain/sub-scale names	Reliability		Convergent/ Criterion[a]	Divergent[a]	Known groups	Sensitivity/ Specificity	Responsive-ness	Location	Source
			α	**Test-retest (ICC, *r*)**							
					(friendships) r = 0.22						
Cataldo Lung Cancer Stigma Scale (CLCSS); *USA*	38	Stigma and shame; Social isolation; Discrimination; Smoking	≥ 0.60; total 0.88	α ≥ 0.60; total α 0.88	**SRDS** r = 0.37	**RSE** r = -0.69	NR	NR	NR	China	Q. Yang et al. (2014)
Chinese Cancer Coherence Scale (CCCS); *Hong Kong – Developed measure*	11	Incoherent-embittered; Coherent-enlightened	≥ 0.86	r ≥ 0.87	CCCS Incoherent-embittered & **PSS**, **Mini-Mac** Negative emotion, Cognitive avoidance, **HADS** r's 0.42 to 0.71; CCCS Coherent-enlightened & Mini-Mac Positive attitude, **RSE, HS, PTGI**-Intrapersonal r's 0.25 to 0.56	NR	NR	NR	NR	Hong Kong	Chan et al. (2007) Study 1
Chinese Social Adjustment Scale (CSAS); *Hong Kong – Developed measure*	33	Relationships with family; Self-image; Relationships with friends; Social enjoyment; Attractiveness and sexuality	≥ 0.63	NR	**GSeS** r's = 0.17 to 0.23; **LOT-R** r's = 0.21 to 0.27	**CHQ-12** r's ns or r's = -0.25 to -0.36	Age, Treatment type	NR	NR	Hong Kong	Fielding & Lam (2004) Study 2
Decisional Conflict Scale (DCS); *Canada*	14	Informed and values clarity; Uncertainty and effective decision; Support	≥ 0.51; total 0.81	NR	**Perceived TDM** r = 0.53; **DRS** r = 0.21; **MISS** r = -0.52; **HADS** r = 0.31 to 0.33	NR	Delay vs. non-delay decision maker	NR	NR	Hong Kong	W.W.T. Lam et al. (2012)
Posttraumatic Growth Inventory (PTGI); *USA*	15	Self; Interpersonal; Life Orientation; Spiritual	≥ 0.43; total 0.83	NR	**Mini-Mac** Positive attitude r's = 0.19 to 0.61	**Mini-Mac** Negative emotion r's = -0.17 to -0.51; **PTGI** Self & **HADS, GHQ-12** r's = -0.42 to -0.53	NR	NR	NR	Hong Kong	S.M. Ho et al. (2004)
	15	Self; Interpersonal; Life	≥ 0.51;	NR	NR	NR	NR	NR	NR	Taiwan	S.M. Ho

Measure (Abbreviation) *Country of Origin*	Items	Domain/sub-scale names	Reliability		Convergent/ Criterion[a]	Divergent[a]	Known groups	Sensitivity/ Specificity	Responsive-ness	Location	Source
			α	Test-retest (ICC, *r*)							
		Orientation; Spiritual	total 0.86								et al. (2013)
Resilience Scale (RS)-14; *USA*	14	Personal competence; Acceptance of self and life	≥ 0.82; total 0.93	NR	**HADS** (r's NR)	NR	QOL (high vs. low)	**Sensitivity:** 0.74 **Specificity:** 0.71 **Optimal cut-off:** 64	NR	China	Tian & Hong (2013) Study 2
Sense of Coherence Scale (SOC-13); *Israel*	13	Comprehensibility; Manageability; Meaningfulness	≥ 0.43; total 0.82	NR	**FACT-CX** r's = 0.32 to 0.61	NR	NR	NR	NR	China	Y. Ding et al. (2012)
Social Relational Quality Scale (SRQS); *Hong Kong*	17	Family intimacy; Family commitment; Friendships	≥ 0.75	NR	**LOT-R** r = 0.30 to 0.38; **HS** r ≥ 0.40	**Physical symptoms** ns; **PSS** r = 0.21 to 0.40	Age	NR	NR	Hong Kong	Hou et al. (2009)
Spiritual Distress Scale (SDS); *Taiwan – Developed measure*	30	Relations with self; Relations with others; Relations with God; Attitude towards death	≥ 0.90; total 0.95	NR	NR	NR	NR	NR	NR	Taiwan	Ku et al. (2010)
Unmet Needs											
Cancer Needs Questionnaire Short Form-Head and Neck (CNQ-SF-HN); *Australia*	36	Health information; Patient care and support; Psychological; Interpersonal/communication; Physical and daily living; Head and neck cancer-specific	≥ 0.85; total 0.97	ICC 0.80	**HADS**-Anxiety r = 0.59; HADS-Depression r = 0.51	**KPS** r = -0.35; **UW-QOL** r = -0.37	Treatment type, Cancer stage	NR	NR	Taiwan	S-C. Chen et al. (2011)
Supportive Care Needs Survey – Short Form (SCNS-SF34); *Australia*	33	Health system, information and patient support; Psychological; Physical and daily living; Sexuality	≥ 0.75	NR	**HADS, CHQ-12, MSAS-SF** or **PANAS-NA** positive r's	**PANAS-PA or LOT-R** ns	Treatment type, cancer stage	NR	NR	Hong Kong	Au et al. (2011)
	34	Health support and information; Patient care and support; Psychological; Physical and daily living; Sexual	^{HK} ≥ 0.53 ^{T} ≥ 0.76	NR	**PSQ-9** r's = 0.26 to 0.31; **HADS, SDS** r's = 0.50 to 0.74	NR	Gender, Age	NR	NR	Hong Kong Taiwan	W.W.Y. Li et al. (2013)

F = Female; HK = Hong Kong; ICC = Intra-class correlation coefficient; M = Male; N/A = Not applicable (developed measure); NR = details not reported in article; ns = Not significant; NPV = Negative Predictive Value; PPV = Positive Predictive Value; SD = Standard Deviation; T = Taiwan; ✓= Evidence of inclusion in the study.

[a] = Refer to Table 5 footnotes for meaning of abbreviations

Table 7

Measure characteristics, cultural adaptation process, psychometric properties and associated sample characteristics for English language only abstracts

Measure (Abbreviation) *Country of Origin*	Items	Source Author Year Journal	Sample characteristics					Cultural adaptation process	Reliability		Validity
			Location	N	Age in yrs M (SD)	Sex (%)	Cancer type (%)		α	Test-retest (ICC, *r*)	
Psychological Distress											
Anxiety Sensitivity Index-3 (ASI-3); *NR*	NR	Y-T. Wang et al. (2013)	NR	676	NR	F (100)	Breast	NR	≥ 0.91; total 0.94	*r* = ≥ 0.67; total 0.86	✓
Distress Thermometer (DT) + Problem List (PL); *USA*	NR	Y-N. Zhang, Zhang, Song, & Tang (2010)	China	4815	NR	NR	Mixed	NR	NR	NR	NR
Mini-Mental Adjustment to Cancer (Mini-Mac); *UK*	19	Guan et al. (2008)	China	197	NR	NR	Mixed	NR	≥ 0.74; total 0.86	*r* = 0.49	✓
Other Psychosocial											
Cancer Coping Modes Questionnaire (CCMQ); *China*	26	X-W. Huang, Guo, & Wang (2007)	China	557	NR	NR	Mixed	N/A	≥ 0.68; total 0.88	*r* = ≥ 0.76; total 0.86	✓
Life Event Experience Schedule-Revised (LEES-R); *China*	41	Y. Zhang, Song, Yao, Xia, & et al. (1992)	NR	282	NR	NR	Mixed	N/A	NR	NR	NR
Psychological Adjustment Scale for Cancer Patients (PASCP); *China*	36	X-W. Huang, Wang, & Zhang (2007)	China	557	NR	NR	Mixed	N/A	≥ 0.69; total 0.89	*r* = ≥ 0.76; total 0.89	✓
Fatigue											
Chinese Cancer Fatigue Scale (CFS-C); *Japan*	15	F-L. Zhang, Ding, & Han (2011)	NR	200	NR	NR	Mixed	Forward, synthesis, back, review, pilot	≥ 0.63	*r* = ≥ 0.55	✓
Quality of Life											
Cancer Rehabilitation Evaluation System-Short Form (CARES-SF); *NR*	NR	Y. Hu & Sellick (2006)	NR	146	NR	NR	Mixed	NR	≥ 0.66	*r* = 0.81	✓
EORTC QLQ-Core Questionnaire (C30); *Europe*	30	Jiang & Liu (2005)	NR	140	NR	NR	Gastric	NR	0.81	ICC ≥ 0.75	✓
Gastric (STO22)	22	Jiang, Xu, & Liu (2005)	NR	140	NR	NR	Gastric	NR	0.80	ICC ≥ 0.75	✓
FACT-Breast (BR); *USA*		C. Wan et al. (2003)	China	165	29-74yrs	F (100)	Breast	Forward, back, "culture adaptation"	≥ 0.61	*r* = ≥ 0.82; total 0.89	NR
Lung Cancer Symptoms List (LCSL) of		You & Shi	NR	363	NR	NR	Lung	NR	NR	NR	✓

Measure (Abbreviation) *Country of Origin*	Items	Source Author Year Journal	Sample characteristics					Cultural adaptation process	Reliability		Validity
			Location	N	Age in yrs M (SD)	Sex (%)	Cancer type (%)		α	Test-retest (ICC, *r*)	
Traditional Chinese Medicine; *NR*		(2005)									
Quality of Life Index (QLI); *NR*	NR	J. Luo & Sun (1999)	NR	111	≥ 15 yrs	NR	Mixed	NR	NR	NR	✓
QLICP-General Model (GM); *China*	32	C.H. Wan et al. (2007)	China	448	NR	NR	Mixed	N/A	NR	NR	✓
Breast Cancer (BR); *China*	NR	Z. Yang et al. (2007)	China	186	NR	F (100)	Breast	N/A	> 0.65; except social domain (0.58)	*r* = > 0.75	✓
Colorectal Cancer (CR); *China*	NR	Z. Yang et al. (2008)	China	110	NR	NR	Colorectal	N/A	> 0.85; except social (0.66) & side effect (0.63) domains	*r* = ≥ 0.78	✓
Stomach Cancer (ST); *China*	NR	Meng et al. (2008b)	China	86	NR	NR	Stomach	N/A	> 0.65; total 0.91	*r* = ≥ 0.90	✓
Quality of Life Questionnaire for Chinese Cancer patient receiving Chemobiotherapy (QLQ-CCC); *China*	35	J. Luo, Sun, & Zhou (1997)	China	NR	NR	NR	Mixed	N/A	NR	NR	NR

EORTC QLQ = European Organization for Research and Treatment of Cancer Quality of Life Questionnaire; FACT = Functional Assessment of Cancer Therapy; QLICP = Quality of Life Instruments for Cancer Patients; F = Female; ICC = Intra-class correlation coefficient; N/A = Not applicable (developed measure); NR = details not reported in abstract; ✓= Evidence of validity reported in abstract.

Figure 1. PRISMA flow diagram of systematic review inclusion and exclusion process

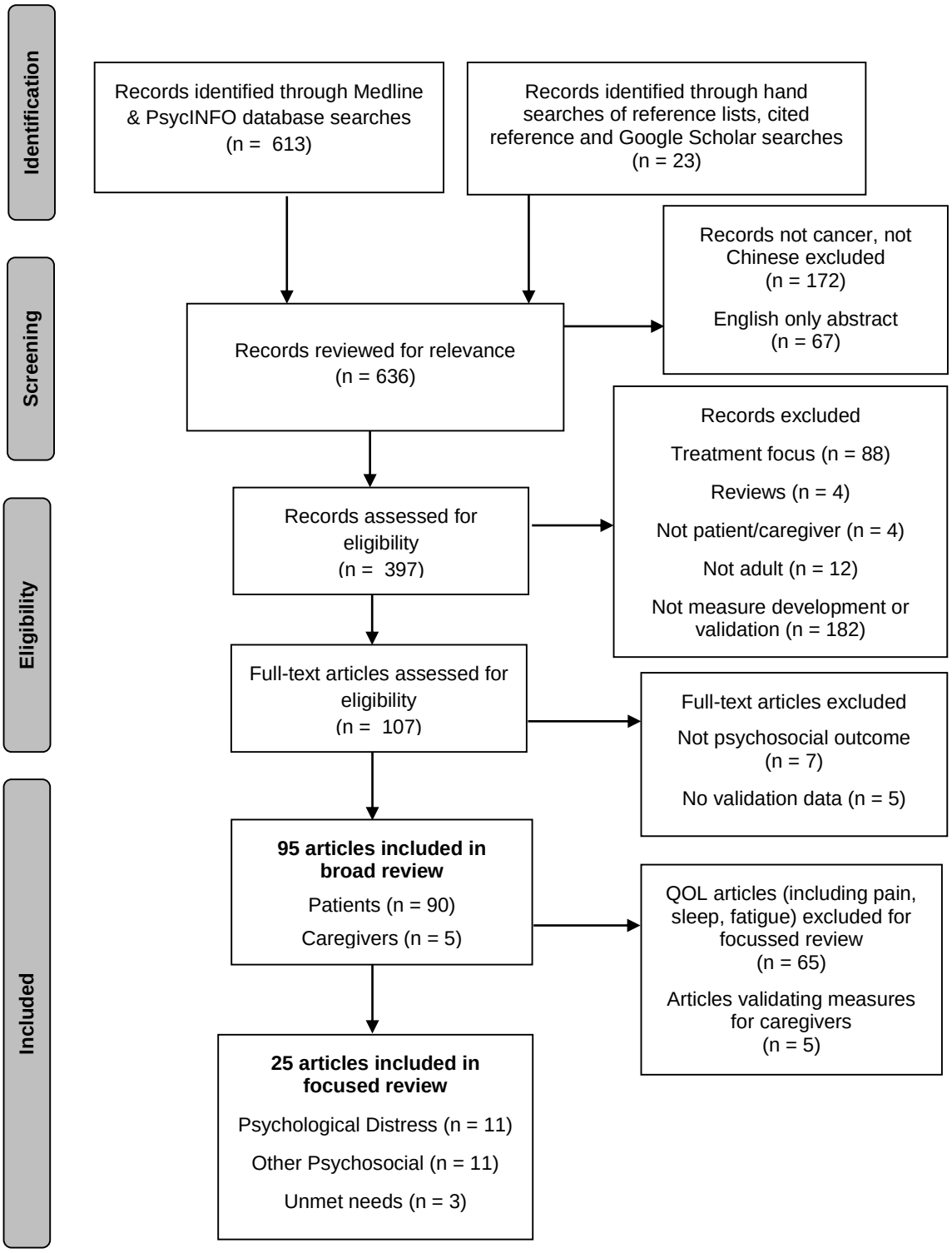

Figure 2. Instrument validation focus and trend over time

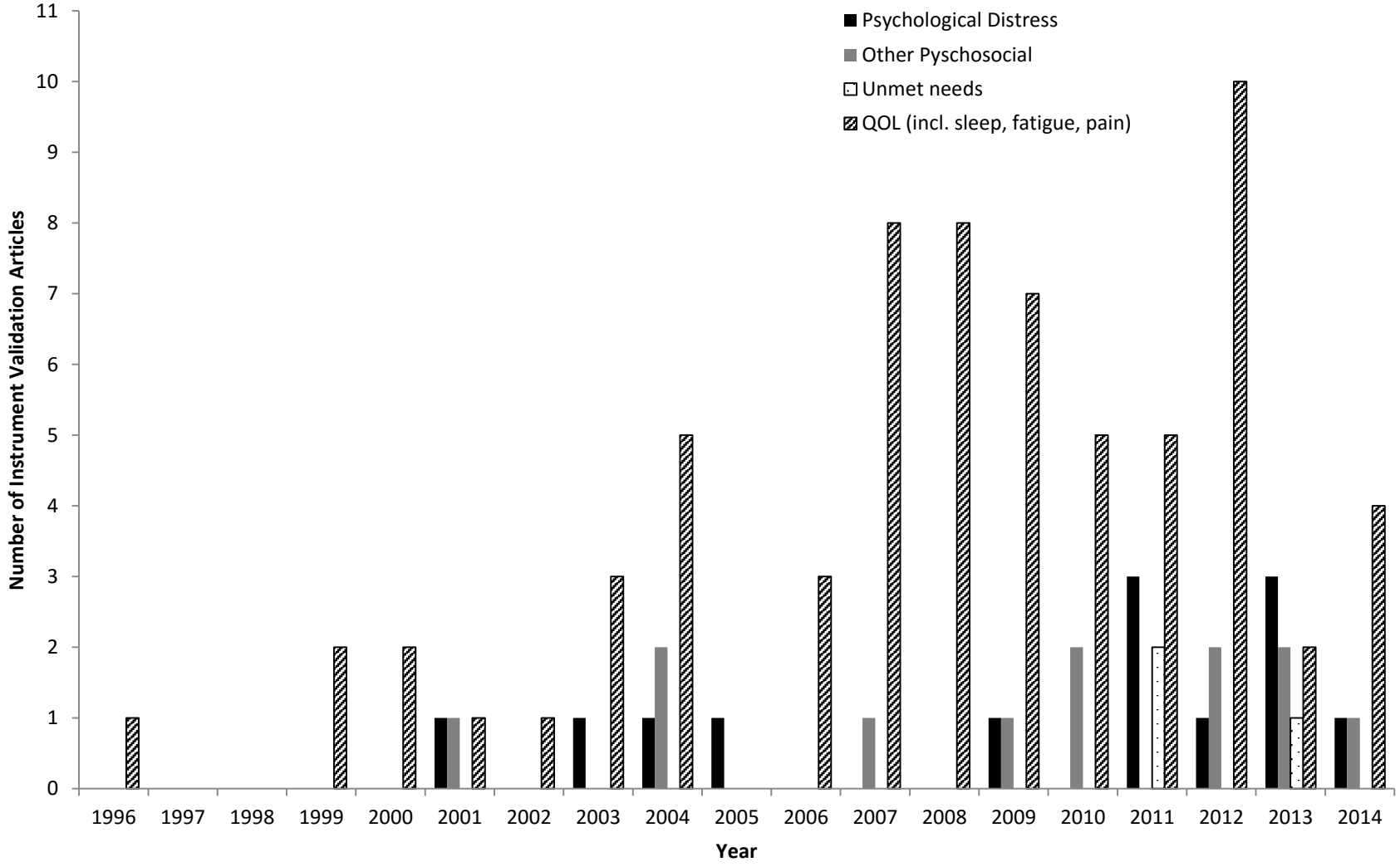

Figure 3. Cancer type represented in instrument validation articles in Chinese regions