

This material is protected by U.S. copyright law. Unauthorized reproduction is prohibited. To purchase quantity reprints, please e-mail reprints@ons.org or to request permission to reproduce multiple copies, please e-mail pubpermissions@ons.org.

Development and Initial Evaluation of Reliability and Validity of the Opioid-Taking Self-Efficacy Scale

Shu-Yuan Liang, MSN, RN, Patsy Yates, PhD, RN, Helen Edwards, PhD, RN,
and Shio-Luan Tsay, PhD, RN

Purpose/Objectives: To examine the reliability and validity of the Opioid-Taking Self-Efficacy Scale–Cancer (OTSES-CA).

Design: Survey of two separate samples.

Setting: Two teaching hospitals in the Taipei area of Taiwan.

Sample: 30 (stage 2, pilot study) and a second cohort of 92 (stage 3) outpatients who had been prescribed opioid analgesics for cancer-related pain.

Methods: A preliminary set of 35 items was developed from qualitative interviews to assess the key domains of self-efficacy. The scale properties were evaluated with the first sample using face validity, test-retest reliability, and Cronbach alpha. Construct validity using exploratory factor analysis and concurrent validity were evaluated with the second sample.

Main Research Variables: Opioid-taking self-efficacy.

Findings: An initial pilot study supported face validity and test-retest reliability with stability coefficients for the subscales of the OTSES-CA, ranging from 0.68 (taking analgesics according to schedule) to 0.82 (communicating about pain and taking analgesics). An exploratory factor analysis demonstrated the multidimensionality of the OTSES-CA. Four factors were identified: communicating about pain and analgesic-taking, tailoring the medication regimen, acquiring help, and managing treatment-related concerns. Cronbach alpha coefficients reached the 0.80 criterion for each of four subscales constructed from items loading on these factors. Significant correlations among the total score of the OTSES-CA and mean adherence rates, pain relief, and worst pain support the concurrent validity of the OTSES-CA.

Conclusions: The data provide preliminary evidence of acceptable psychometric properties for the OTSES-CA designed to measure patients' self-efficacy with taking opioids. Further validation is recommended to confirm the four dimensions of the construct.

Implications for Nursing: The OTSES-CA can be used in research and clinical settings to identify various impediments to opioid adherence.

1998; Hsieh, 2005; Lin, 1999). Pain is one of the symptoms that patients fear most (Holtan et al., 2007); it overwhelms all aspects of patients' lives (Holtan et al.) and creates a sense of uncertainty and hopelessness (Avemark, Ericsson, & Ljunggren, 2003). Pain control is, therefore, a high priority in the treatment of patients with cancer. The purpose of this study was to develop and evaluate a tool to measure opioid-taking self-efficacy among Taiwanese outpatients with cancer.

Because pharmacologic agents are considered to be a cornerstone of cancer pain management, patients handling their prescribed analgesic regimens is key to successful cancer pain control. Medication adherence rates among patients who have prescribed analgesics for their cancer pain are, however, lower than what are needed to achieve optimal pain control (Chang, Chang, Chiou, Tsou, & Lin, 2002; Du Pen et al., 1999; Lai et al., 2002; Miaskowski et al., 2001; Zeppetella, 1999). Evidence suggests that many patients have practical difficulties with medication adherence, such as taking around-the-clock doses at regularly scheduled intervals, taking a recommended "rescue dose" for breakthrough pain, and regulating pain medications to balance pain relief with opioid-related side effects (Beck, 1998; Miaskowski et al., 2001; Riddell & Fitch, 1997; Schumacher et al., 2002).

Shu-Yuan Liang, MSN, RN, is a lecturer in the Department of Nursing at the National Taipei College of Nursing in Taiwan and a doctor of philosophy candidate at Queensland University of Technology in Brisbane, Australia; Patsy Yates, PhD, RN, is a professor and director of research at the Institute of Health and Biomedical Innovation of Queensland University of Technology; Helen Edwards, PhD, RN, is a professor and head of the School of Nursing at the Institute of Health and Biomedical Innovation of Queensland University of Technology; and Shio-Luan Tsay, PhD, RN, is a professor and head of the Department of Nursing at the National Taipei College of Nursing. No financial relationships to disclose. (Submitted December 2007. Accepted for publication February 4, 2008.)

Digital Object Identifier: 10.1188/08.ONF.E62-E69

Despite the fact that as many as 80%–90% of patients with cancer pain can be treated effectively using pharmacologic therapies and other advanced techniques (American Pain Society, 2003; Reder, 2001), 38%–85% of patients with cancer in Taiwan still experience varying levels of pain (Chiu, 1997; Ger et al., 2004; Ger, Ho, Wang, & Cherng,

Quick Facts: Taiwan

Geography and economy: Taiwan is a relatively small island country in Asia that, as of June 2007, had a total population of about 23 million people. Because of the free economic environment and limited natural resources, Taiwan has transformed from a labor-intensive agricultural economy to a technology- and capital-intensive industrial economy.

Healthcare system: The Taiwan government implemented a National Health Insurance (NHI) program in 1994 that provides universal medical care to all of the citizens in Taiwan. Medical expenses for children who are diagnosed with cancer are covered by NHI for a very small co-pay. Malignant neoplasm ranks first in the leading causes of death for Taiwanese people in 2006. It has been placed at the top position since 1982.

Bibliography

Department of Health. (2006). Cause of death statistics 2006. Retrieved February 12, 2008, from <http://www.doh.gov.tw/EN2006>

Social and behavioral scientists have developed a number of theories and models to explain how individuals' belief systems influence their health behaviors, such as medication adherence (Bandura, 2001; Becker, 1974; Fishbein & Ajzen, 1975). Bandura (2001) asserted that cognitive processes, particularly perceptions of self-efficacy, play an important role in how individuals acquire new behaviors and retain old ones. In particular, these cognitive processes contribute to how individuals judge their ability to perform specific behaviors and crucially influence their choice and persistence in those behaviors. Self-efficacy is defined as individuals' personal beliefs regarding their capabilities to carry out specific tasks to achieve desired outcomes (Bandura, 2006). Self-efficacy theory suggests that people with strong efficacy expectations are more likely to persist with difficult tasks, even after experiencing an initial impediment or failure.

Several studies suggest that self-efficacy has the potential to facilitate adherence behaviors for a range of complex behaviors, including adherence to exercise (Sweeney, Taylor, & Calin, 2002) and weight control programs (Burke, Dunbar-Jacob, Sereika, & Ewart, 2003). Few studies, however, have specifically explored self-efficacy relating to management of cancer pain. Understanding the role of self-efficacy beliefs in influencing patients' responses to pain may assist in the development of clinically relevant strategies for cancer pain management.

To date, the concept of self-efficacy in the context of cancer pain management has not been investigated in any depth. Moreover, the availability of a psychometrically robust instrument to study the potential role of self-efficacy is important in efforts to understand the psychological determinants of health outcomes such as adherence behavior. Because self-efficacy is task-specific, every domain of interest demands a different self-efficacy measure (Burke et al., 2003; Simoni, Frick, & Huang, 2006; Sweeney et al., 2002). A search of the literature yielded no instrument that measured perceived opioid-taking self-efficacy in patients with cancer-related pain.

Bandura (2006) stated that, in developing self-efficacy scales, the researcher must structure the scale to identify the level of challenges and obstacles to successful performance of necessary behaviors or tasks. Participants judge their capability (strength of self-efficacy) to overcome various obstacles

(level of self-efficacy). Moreover, a self-efficacy scale should include items representing performances and challenges that are sufficiently difficult to avoid ceiling effects.

Methods

Design

The present study was carried out in three stages. The purpose of stage 1 was item generation. This stage involved qualitative interviews with a sample of 19 patients with cancer with pain and a literature review to identify key behaviors or tasks involved in taking opioid analgesics and the factors that may influence these behaviors. The findings from this stage are reported elsewhere (Liang, Yates, Edwards, & Tsai, in press). Stage 2 was a pilot test to evaluate the feasibility and reliability of the preliminary scale developed from these qualitative interviews. Stage 3 involved exploratory factor analysis and concurrent validity testing. This article reports findings from stages 2 and 3. The study was approved by the institutional ethics committees of the participating agencies and all patients provided informed consent.

Pilot Study (Stage 2)

Instrument development: A draft of the 36-item, self-administered Opioid-Taking Self-Efficacy Scale–Cancer (OTSES-CA) was developed from a previous qualitative study. It included nine items to measure communicating about pain and taking analgesics, nine items regarding tailoring the medication regimens, three items about taking analgesics according to schedule, six items about acquiring help, and nine items regarding managing treatment-related concerns. Scale items were written based on the themes emerging from the interview data and the literature to measure the key behaviors or tasks associated with opioid-taking self-efficacy. Items reflected the various situations in which these tasks or behaviors were applied. Each item was (a) included to assess degree of confidence related to behaviors associated with taking opioids for cancer pain, (b) written in such a way that patients with minimum educational levels could understand it, and (c) phrased in positive terms to assess patients' specific confidence about taking opioids for their cancer pain.

An 11-point scale was used to measure the strength of the subject's confidence in various circumstances. The scale ranged from 0 (not at all confident) to 10 (completely confident) so that a higher score meant higher perceived opioid-taking self-efficacy.

The interviews in stage 1 were conducted in Chinese. The Chinese transcripts were then translated into English to enable the English-speaking coauthors to read the transcripts and discuss emerging themes. The themes were used to develop items for the OTSES-CA. The original English version of the scale was then translated into Chinese by a professional bilingual translator (English and Chinese) from the Cambridge Translation Service Company in Taiwan. A second professional bilingual translator (English and Chinese) from the Choice Language Service Company who had not seen the original English version was contacted to prepare a back-translation into English. The English back translation of the items and the originals then were compared by a native English-speaking oncology nursing professor who judged the items as equivalent to the original version.

Two native English-speaking experts (one professor and one postdoctoral researcher specializing in self-efficacy research) reviewed the initial English version of the scale for relevance and clarity. Although agreement as to the overall content validity was 100%, the experts suggested that some questions be reworded. One item developed to measure an aspect of tailoring the medication regimens was thought to be duplicative and was deleted. A panel of three native Chinese-speaking experts (an oncology physician, a palliative care nurse, and a professor specializing in oncology nursing) was asked to review the version of the scale for relevance and clarity, with 94% agreement on all items. Minor changes were made to the wording of some items on the basis of suggestions of the panellists. The 35-item Chinese version of the scale was used in the pilot study. The pilot study was designed to assess reliability and feasibility of the tool. Specifically, feasibility of use, internal consistency, and test-retest reliability were assessed.

Sample: The initial tool was pilot-tested with 30 patients in the oncology outpatient departments of two hospitals in the Taipei area. Patients for this step of the research had a cancer diagnosis, and had an average pain intensity score of 3 or greater on a 0–10 scale in the prior 24 hours, were prescribed opioid analgesics for cancer-related pain on an around-the-clock and as needed basis in the prior week at least, were older than 18 years, and were conscious and able to sign the consent form. Subjects included 16 men (53%) and 14 women (47%). Participants ranged in age from 20–62 years old, with a mean age of 44.4 years ($SD = 9.7$ years). Most subjects were married (73%), lived with others (87%), had a mean education of 11.4 years, were Buddhist (43%) or had no religion (27%), and were not working (50% unemployed, 23% medical leave).

Internal consistency: Internal consistency was evaluated with item-to-total correlation coefficient and Cronbach alpha coefficient. An item-total correlation greater than 0.40 is desirable (Knoke & Bohrnstedt, 1994), and a Cronbach alpha coefficient value of 0.80 or greater is generally an accepted level of adequate internal consistency for new instruments (Ozdamar, 1999).

Internal consistency was tested for the scale and subscales. The initial internal reliability coefficient for the entire scale was 0.96. The Cronbach alphas for each of the five preliminary subscales developed to measure the key five constructs that emerged from the stage 1 interviews was greater than 0.70. In addition, all item-total correlations were greater than 0.40.

Test-retest reliability: Stability was established by test-retest among the initial pilot sample. The retest occurred approximately two weeks after the initial completion of the scale. For stability, the correlation coefficient should be approximately 0.70 for a newly developed tool (Nunnally & Bernstein, 1994).

The results of test-retest reliability revealed a statistically significant association between the original score and the retest score ($r = 0.68$, $p < 0.01$ – $r = 0.82$, $p < 0.01$) for each of the subscales. In addition, a paired t test assessed if a significant change occurred in the total scale score during the time between the first and second administration. The t test for difference between scores was not significant.

Feasibility: Ten of the 30 subjects participated in a brief, structured interview to elicit their opinions regarding the tool.

Subjects were asked to comment on the timing and clarity of questions and whether they were uncomfortable answering questions. They also were invited to add questions relevant to the topic. Average time to complete the scale was 11 minutes (possible range 7.5–20 minutes). One participant suggested a 0–5 scale instead of a 0–10 item scale. Pajares, Hartley, and Valiante (2001) have demonstrated that a 0–100 scale better predicts self-efficacy belief than a 1–6 response scale. In addition, Bandura (2006) has warned that self-efficacy response scales with too few steps should be avoided as they are less sensitive and less reliable; however, a simpler response format, such as a 0–10 scale, retains the same scale structure and descriptors as a 0–100 scale. Therefore, the 11-point format was retained.

Construct and Concurrent Validity (Stage 3)

Sample: The sample consisted of 92 outpatients with cancer recruited from two teaching hospitals in the Taipei area of Taiwan. The sampling frame and inclusion criterion were the same as described previously for patients in the pilot study.

Measures: In addition to the 35-item OTSES-CA, two measures relevant to concurrent validity were administered to the 92 Taiwanese outpatients with cancer: percentage opioid adherence rate and the Brief Pain Inventory Short Form (BPI-SF). Self-efficacy has become a cognitive construct integral to understanding behavior (Bandura, 2004) and pain experience (Nicholas, 2007). The validity and reliability of BPI-SF for pain experience is well established (Klepstad et al., 2002; Radbruch et al., 1999), and as such, percentage opioid adherence rate and BPI-SF were chosen as the “gold standard” in testing the validity of the OTSES-CA.

For analgesic adherence, a mean adherence rate was calculated using dose taken divided by dose prescribed, multiplied by 100. For the mean adherence rate, all opioid analgesics were converted to morphine equivalents. Analgesic adherence was assessed by patient self-report at interview. The researcher transcribed the prescribed medication, strength, dosage and route, and frequency of the prescribed opioid analgesics from the patient’s medical record. Patients were then asked to report their pain medication used, including strength, dosage and route, and frequency in the prior 24 hours for each medication in turn. A chart with the picture and the name of each available medication on the market was provided to help respondents recall the name of their medication.

Pain experience was measured by the BPI-SF Chinese version (Wang, Mendoza, Gao, & Cleeland, 1996). The BPI-SF is comprised of four items to assess pain intensity (worst, least, average, and current pain), seven items to assess pain interference, and one item to assess pain relief in the past 24 hours. The validity and reliability of the instrument are well established, with the instrument being used in numerous studies across the world (Lin, 2001; Reyes-Gibby et al., 2006; Yates et al., 2004).

Results

Sample

Subjects included 54 (59%) men and 38 (41%) women. Participants ranged in age from 30–92 years old with a mean age of 56.4 years ($SD = 12.2$ years). Most subjects were married (74%), lived with others (89%), had a mean education

of 9.2 years, were Buddhist (51%) or Taoist (22%), and were not working (57% unemployed, 20% retired).

Construct Validity of the Opioid-Taking Self-Efficacy Scale–Cancer

An exploratory principal component factor analysis was performed in an attempt to detect the latent constructs in the initial set of 35 self-efficacy items. Factor analysis revealed the Kaiser-Meyer-Olkin measure of sampling adequacy was 0.839 and the Barlett's Test of Sphericity showed a significance level ($\chi^2 = 2749.13$, $df = 595$, $p = 0.000$), indicating that the assumptions for a factor analysis were met.

The initial principal component factor analysis with orthogonal varimax rotation generated eight factors with an eigenvalue of 1.00 or greater that accounted for 74.98% of the variance. All items loaded onto at least one factor at the 0.40 level or above. Communalities for all items were greater than 0.60.

To determine and interpret the number of items and factors to retain, several statistical procedures as well as conceptual foundations were considered (DiIorio, 2005). Although three items that were originally conceptualized as measuring "taking analgesics according to schedule" loaded on two separate factors, they could not be distinguished conceptually. The items were therefore deleted from the measure. In addition, one item originally conceptualized as measuring the construct of "tailoring the medication regimen" loaded on factor 4. The item did not fit conceptually with the remainder of items loading on that factor, which were seen to measure the concept of "acquiring help." The item, therefore, also was deleted. Of the original 35 items, 4 items were discarded and 31 were retained.

A final factor analysis was performed on the remaining 31 items to confirm the robustness of the proposed factor structure after removing the four items. The analysis resulted in the extraction of seven factors with eigenvalues greater than 1, accounting for 73.16% of the variance (see Table 1). Communalities in the analysis were between 0.60 and 0.90. Items that loaded at greater than 0.4 (cut-off) on more than one factor were placed on the factor with the best conceptual fit with the initial constructs (DiIorio, 2005).

The results of the final factor analysis confirmed the constructs of communication about pain and analgesic taking (factor 1) and tailoring the medication regimen (factor 2). Moreover, apart from one item (item 34), all items loading on factor 3 reflected the dimension of acquiring help. Items originally developed to assess the concepts of managing treatment-related concerns continued to load separate factors (one item loading on factor 3 [item 34] and the other items loading on factor 4 to factor 7).

Factor 7 was deleted because only one item (item 32) loaded above 0.4 on this factor. After the item was deleted, factor 4 was combined with factor 6 to create one scale assessing management of treatment-related concerns. The rationale for combining items on these three factors was that communalities among items loading on factor 4 to factor 6 were all above 0.6, suggesting the items shared common factor variance (MacCallum, Widaman, Zhang, & Hong, 1999). Moreover, the correlations among these factors demonstrated average intercorrelations ($r = 0.38$ – 0.55 , $p < 0.01$), further suggesting these factors were conceptually related. The initial theoretical foundations developed in the early stage of this

study suggested the important unique contribution to opioid-taking self-efficacy of this construct.

One item (treat constipation associated with taking pain medications, item 34) originally conceptualized as measuring the construct of managing treatment-related concerns that loaded on factor 3 (acquiring help), also was added to items loading on factors 4–6 to measure the construct because it did not fit conceptually with the notion of acquiring help. This process of comparing results of factor analysis with the results of the initial stage of this study resulted in four main constructs being represented by 30 of the 35 items. The subscale names and associated items are presented in Figure 1.

Internal Consistency of the Revised Opioid-Taking Self-Efficacy Scale–Cancer

Internal consistency was tested for the 30-item scale and subscales (see Table 2). The initial internal reliability coefficient for the entire scale was 0.95. The Cronbach alpha for each subscale was above 0.80. In addition, all item-total correlations were greater than 0.40.

Concurrent Validity of the Revised Opioid-Taking Self-Efficacy Scale–Cancer

The total OTSES-CA score was significantly and positively correlated with adherence to an around-the-clock analgesic regimen ($r = 0.22$, $p < 0.05$); in particular, the subscale assessing perceived self-efficacy with managing treatment-related concerns was significantly and positively related to greater adherence to an around-the-clock analgesic regimen ($r = 0.25$, $p < 0.05$). In addition, the OTSES-CA was significantly and positively correlated with reported pain relief ($r = 0.35$, $p < 0.01$ for total score and $r = 0.27$, $p < 0.01$ – $r = 0.36$, $p < 0.01$ for all subscale scores) and worst pain ($r = 0.25$, $p < 0.05$ for total score, $r = 0.25$, $p < 0.05$ for communication about pain and analgesic taking subscale and $r = 0.23$, $p < 0.05$ for managing treatment-related concerns subscale).

Discussion

The study focused on the development and preliminary evaluation of a scale to measure self-efficacy of patients with cancer in adhering prescribed opioid regimens. The final OTSES-CA is a 30-item, patient-derived, self-administered scale. Results of the Cronbach alpha and test-retest reliability demonstrate that the OTSES-CA is internally consistent and yields stable scores over time. The Cronbach alphas for each subscale reached the recognized criteria of 0.80 for a new scale (Ozdamar, 1999), indicating good reliability. Given that the number of items is likely to influence the estimate of internal consistency (DiIorio, 2005), an alpha level of 0.95 is considered to be good for the 30-item OTSES-CA scale. Items in each subscale also demonstrated acceptable item-total correlations of higher than 0.40 (Knoke & Bohmstedt, 1994). In the present study, results of test-retest reliability in the initial pilot test ranged from 0.71–0.82 for subscales in the OTSES-CA, with the exception of a correlation coefficient of 0.68 for "taking analgesics according to schedule" and 0.69 for "managing treatment-related concerns." For test-retest analysis to assess stability, a correlation coefficient of 0.70 generally is considered acceptable (Nunnally & Bernstein, 1994). The test-retest reliability was, however, not conducted with the final 30-item version of the OTSES-CA.

Table 1. Components of Factors and Communalities for the Opioid-Taking Self-Efficacy Scale—Cancer

Item	Factor							h ^{2a}
	1	2	3	4	5	6	7	
Factor 1: Communication about pain and taking analgesics								
1. Talk with healthcare professionals about how my pain feels	0.775	0.209	0.133	0.176	0.197	-0.195	-0.031	0.772
11. Talk with family members about how well my pain medications are working	0.755	0.113	0.194	0.304	0.042	0.197	-0.066	0.758
25. Talk with family members about how my pain feels	0.723	0.032	0.394	0.072	0.085	0.178	0.015	0.723
18. Talk with healthcare professionals when pain medications do not relieve my pain	0.715	0.245	0.160	0.103	0.116	0.186	0.129	0.672
17. Talk with healthcare professionals about my fears about taking pain medications	0.702	0.370	0.019	0.181	0.153	0.206	0.223	0.779
16. Talk with healthcare professionals about how well my pain medications are working	0.688	0.471	-0.093	0.095	0.170	0.150	0.117	0.779
30. Talk with healthcare professionals about the side effects of pain medications	0.652	0.217	0.334	-0.051	0.257	0.230	0.161	0.731
29. Talk with healthcare professionals when I think the pain medication is no longer needed	0.648	0.153	0.115	0.050	0.359	0.146	0.222	0.658
2. Talk with healthcare professionals about how to take pain medication safely	0.471	0.372	0.146	0.235	0.366	-0.254	0.020	0.636
Factor 2: Tailoring the medication regimen								
13. Change amount of pain medications if the pain comes on suddenly	0.182	0.831	0.160	0.151	0.157	-0.016	0.081	0.804
12. Change amount of pain medications when they do not relieve my pain	0.213	0.791	0.098	0.045	0.024	0.042	0.229	0.737
20. Change amount of pain medications if the pain returns too quickly	0.107	0.768	0.286	0.083	-0.074	0.140	0.251	0.778
26. Change amount of pain medications when the pain is getting worse	0.275	0.713	0.161	-0.022	0.063	0.225	0.102	0.676
27. Change amount of pain medications when I am doing things that make the pain worse	0.182	0.685	0.286	0.194	-0.044	0.203	0.050	0.667
7. Change amount of pain medications to ensure I have a good night's sleep	0.267	0.555	0.333	0.050	0.403	-0.091	-0.141	0.682
21. Change amount of pain medications to reduce any side effects	0.472	0.534	0.005	0.101	0.319	0.234	-0.052	0.677
Factor 3: Acquiring help								
5. Get help to access pain medications if I cannot afford them	0.294	0.486	0.433	0.178	0.098	0.393	0.030	0.706
22. Get help to take pain medications if needed	0.315	0.293	0.663	0.117	0.181	0.066	-0.055	0.679
33. Access healthcare professionals when I have concerns about my pain or pain medications	0.279	0.148	0.609	0.174	0.160	0.355	0.152	0.675
35. Get help to get stronger pain medications if needed	0.040	0.424	0.598	0.194	-0.074	0.214	0.165	0.655
19. Get help to access pain medications if I cannot go out	0.223	0.256	0.588	0.241	0.082	-0.125	0.383	0.675
14. Access healthcare professionals who are experienced in managing pain with medications	0.072	0.380	0.512	0.006	0.136	-0.017	0.527	0.709
Factor 4: Managing treatment-related concerns								
10. Treat drowsiness associated with taking pain medications	0.197	0.067	0.209	0.874	0.194	0.086	-0.029	0.897
9. Treat dizziness associated with taking pain medications	0.142	0.130	0.218	0.811	0.201	0.136	0.061	0.805
24. Take pain medications even if I am nauseated	0.379	0.241	-0.043	0.480	-0.207	0.302	0.190	0.604
34. Treat constipation associated with taking pain medications	0.054	0.233	0.417	0.303	0.139	0.611	-0.010	0.716
Factor 5: Managing treatment-related concerns								
4. Overcome my concerns about any change in my pain	0.261	0.084	0.007	0.222	0.841	0.117	0.035	0.846
3. Overcome my concerns about the cause of my pain	0.353	-0.020	0.292	0.096	0.736	0.194	0.057	0.842
Factor 6: Managing treatment-related concerns								
28. Overcome my concerns about addiction to pain medications	0.411	0.129	0.150	0.073	0.118	0.707	0.107	0.740
15. Overcome my concerns about side effects of pain medications	0.224	0.315	-0.063	0.371	0.379	0.532	0.104	0.729
Factor 7: Managing treatment-related concerns								
32. Take pain medications even if I have difficulty in swallowing	0.162	0.218	0.124	0.043	0.014	0.126	0.868	0.861
Eigenvalue	13.10	2.67	1.90	1.44	1.39	1.14	1.02	
Variance explained (%)	18.37	16.77	9.95	7.88	7.84	7.13	5.22	
Cumulative (%)	18.37	35.14	45.09	52.97	60.81	67.94	73.16	

N = 92

^aCommunality

Subscale 1: Communication about pain and taking analgesics

1. Talk with healthcare professionals about how my pain feels
2. Talk with healthcare professionals about how to take pain medication safely
11. Talk with family members about how well my pain medications are working
16. Talk with healthcare professionals about how well my pain medications are working
17. Talk with healthcare professionals about my fears about taking pain medications
18. Talk with healthcare professionals when pain medications do not relieve my pain
25. Talk with family members about how my pain feels
29. Talk with healthcare professionals when I think the pain medication is no longer needed
30. Talk with healthcare professionals about the side effects of pain medications

Subscale 2: Tailoring the medication regimen

7. Change amount of pain medications to ensure I have a good night's sleep
12. Change amount of pain medications when they do not relieve my pain
13. Change amount of pain medications if the pain comes on suddenly
20. Change amount of pain medications if the pain returns too quickly
21. Change amount of pain medications to reduce any side effects
26. Change amount of pain medications when the pain is getting worse
27. Change amount of pain medications when I am doing things that make the pain worse

Subscale 3: Acquiring help

5. Get help to access pain medications if I cannot afford them
14. Access healthcare professionals who are experienced in managing pain with medications
19. Get help to access pain medications if I cannot go out
22. Get help to take pain medications if needed
33. Access healthcare professionals when I have concerns about my pain or pain medications
35. Get help to get stronger pain medications if needed

Subscale 4: Managing treatment-related concerns

3. Overcome my concerns about the cause of my pain
 4. Overcome my concerns about any change in my pain
 9. Treat dizziness associated with taking pain medications
 10. Treat drowsiness associated with taking pain medications
 15. Overcome my concerns about side effects of pain medications
 24. Take pain medications even if I am nauseated
 28. Overcome my concerns about addiction to pain medications
 34. Treat constipation associated with taking pain medications
-

Figure 1. Subscales and Item Descriptions of the Opioid-Taking Self-Efficacy Scale–Cancer

The preliminary evaluation of the OTSES-CA also demonstrates that the scale has acceptable construct and concurrent validity. Results of the factor analysis identified the multidimensionality of OTSES-CA with four factors, including communicating about pain and taking analgesics, tailoring the medication regimen, acquiring help, and managing treatment-related concerns. Given the small sample size in this study, further testing to confirm these key dimensions of opioid-taking self efficacy is required. Furthermore, although concurrent validity is demonstrated by significant correlations between the OTSES-CA and measures of adherence behavior and pain experience, some of these correlations are weak.

If the psychometric properties of the OTSES-CA are confirmed in further studies, it has many potential applications for clinical practice and research. For example, the OTSES-CA

can be used to identify specific situations that impede patients in adhering to their prescribed regimen. For clinical practice, the information gathered from this scale can provide clinicians with specific situations that pose challenges for their patients, and by itself, encourage a more focused discussion regarding opioid adherence. For research, the scale can provide an effective outcome measure. For example, self-efficacy can be assessed over time in response to a behavioral, cognitive, or nursing intervention, and thus the scale can be used to evaluate within-patient or between-patient change in self-efficacy over time. It may also be used in studies to investigate mediators or moderators of adherence to prescribed opioid analgesics.

Self-efficacy is a valuable concept that potentially can explain some variance in opioid-taking behavior in patients with cancer. Self-efficacy is a particularly relevant concept because it is flexible (Bandura, 2001) and can be the basis for the development of behavior modification interventions (Bandura, 2004). Specifically, sources of efficacy expectations such as mastery experience, vicarious experience, verbal persuasion, and physiologic and emotional states are well documented. These sources can be incorporated into healthcare interventions that are designed to improve patients' self-efficacy. Although a number of theories and models attempt to explain health behaviors such as treatment adherence (Bandura, 2001; Becker, 1974; Fishbein & Ajzen, 1975), self-efficacy is particularly helpful for understanding situational impediments that prevent patients from taking prescribed opioids to control cancer pain.

A major strength of the OTSES-CA is that it was derived from patients. The items reflect multiple dimensions of tasks, behaviors, and situations associated with taking opioid analgesics identified by patients. This is important, not only because of its inherent content validity but also because it provides a systematic way of assessing patients' individual beliefs in their ability regarding taking prescribed opioids. Another strength of this scale is its behavior specificity, that is, the scale was developed and tested in patients who had been prescribed opioid analgesics for cancer-related pain and taken them for at least the prior week. Such patients are more likely to provide accurate assessment of the beliefs in competencies involved in taking opioids as prescribed. This is important because self-efficacy as a task-specific construct may vary across different groups of behaviors (Bandura, 2006). For example, the competencies involved in taking medication for cancer pain may be different from those involved in taking medications for hypertension.

The OTSES-CA is the first scale developed specifically for opioid analgesics taken by patients with cancer. Furthermore, the preliminary evaluation of the validity of this scale has verified that it is associated with a direct assessment of medication adherence and pain experience. However, limitations of the study are a small sample that was considered insufficient to perform factor analysis on 35 self-efficacy items. A widely used rule of thumb is that one should have 5–10 times as many subjects as items for psychometric testing (Nunnally, 1978). These rules could not be applied in the analysis conducted for this study. Therefore, this scale needs additional psychometric testing to confirm the four dimensions of the construct. Moreover, test-retest reliability of the 30-item measure also needs to be undertaken. Also, the tool was only tested with a Taiwanese population. Although efforts were made to ensure validity of translations and constructs, the instrument should be tested

Table 2. Reliability of the Opioid-Taking Self-Efficacy Scale–Cancer

Subscale	Number of Items	Standardized Item Alpha	Corrected Item-Total Correlation Range
1	9	0.93	0.59–0.80
2	7	0.90	0.58–0.83
3	6	0.86	0.59–0.72
4	8	0.83	0.43–0.64
Total Scale	30	0.95	0.49–0.75

in other populations. In addition, the scale will require further revision and testing for English populations.

Conclusion

This article provides preliminary evidence of the reliability and validity of the OTSES-CA. The reliability estimates obtained for this 30-item scale showed adequate internal consistency. Concurrent validity for opioid-taking self-efficacy also was supported. Further validation is recommended; however, based on the data presented from the study, the scale seems adequate for measuring a variable that is likely to be an im-

portant factor in the success of achieving and maintaining a prescribed opioid-taking regimen for cancer pain.

The authors gratefully acknowledge Professor Lillie Shortridge-Baggett, RN, PhD, and Jan McDowell, RN, PhD, for their invaluable suggestions and counsel related to instrument development as well as the directors of the oncology department in the two hospitals for permitting their clinicians to refer their patients for the study. The authors also thank all of the subjects who participated in this study for their willingness to contribute to improving the care of those experiencing cancer.

Author Contact: Shu-Yuan Liang, MSN, RN, can be reached at shuyuan@ntcn.edu.tw, with copy to editor at ONFEditor@ons.org.

References

- American Pain Society. (2003). *Principles of analgesic use in the treatment of acute pain and cancer pain* (5th ed.). Glenview, IL: Author.
- Avemark, C., Ericsson, K., & Ljunggren, G. (2003). Gender differences in experienced pain, mood, energy, appetite, and sleep by cancer patients in palliative care. *Nursing Science and Research in the Nordic Countries*, 23(1), 42–46.
- Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology*, 52, 1–26.
- Bandura, A. (2004). Health promotion by social cognitive means. *Health Education and Behavior*, 31(2), 143–164.
- Bandura, A. (2006). Guide for constructing self-efficacy scales. In F. Pajares & T. Urdan (Eds.), *Adolescence and education, Vol. 4: Self-efficacy beliefs of adolescents*. Glenview, CT: Information Age Publishing.
- Beck, S.L. (1998). A systematic evaluation of opioid availability and use in the Republic of South Africa. *Journal of Pharmaceutical Care in Pain and Symptom Control*, 6(4), 5–22.
- Becker, M.H. (1974). *The health belief model and personal health behaviour*. Thorofare, NJ: Charles B. Slack.
- Burke, L.E., Dunbar-Jacob, J., Sereika, S., & Ewart, C.K. (2003). Development and testing of the Cholesterol-Lowering Diet Self-Efficacy Scale. *European Journal of Cardiovascular Nursing*, 2(4), 265–273.
- Chang, M., Chang, Y., Chiou, J., Tsou, T., & Lin, C. (2002). Overcoming patient-related barriers to cancer pain management for home care patients: A pilot study. *Cancer Nursing*, 25(6), 470–476.
- Chiu, T.Y. (1997). Pain control in terminal cancer patients. *Formosan Journal of Medicine*, 1, 198–208.
- DiIorio, C.K. (2005). *Measurement in health behaviour: Methods for research and evaluation*. San Francisco, CA: John Wiley and Sons.
- Du Pen, S.L., Du Pen, A.R., Polissar, N., Hansberry, J., Draybill, B.M., Stillman, M., et al. (1999). Implementing guidelines for cancer pain management: Results of a randomized controlled clinical trial. *Journal of Clinical Oncology*, 17(1), 361–370.
- Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behaviour*. Reading, MA: Addison-Welsey.
- Ger, L.P., Chang, C.Y., Ho, S.T., Lee, M.C., Chiang, H.H., Chao, C.S., et al. (2004). Effects of a continuing education program on nurses' practices of cancer pain assessment and their acceptance of patients' pain reports. *Journal of Pain and Symptom Management*, 27(1), 61–71.
- Ger, L.P., Ho, S.T., Wang, J.J., & Cherng, C.H. (1998). The prevalence and severity of cancer pain: A study of newly-diagnosed cancer patients in Taiwan. *Journal of Pain and Symptom Management*, 15(5), 285–293.
- Holtan, A., Aass, N., Nordoy, T., Haugen, D.F., Kaasa, S., Mohr, W., et al. (2007). Prevalence of pain in hospitalised cancer patients in Norway: A national survey. *Palliative Medicine*, 21(1), 7–13.
- Hsieh, R.K. (2005). Pain control in Taiwanese patients with cancer: A multicenter, patient-oriented survey. *Journal of the Formosan Medical Association*, 104(12), 913–919.
- Klepstad P., Loge, J.H., Borchgrevink, P.C., Mendoza, T.R., Cleeland, C.S., Kaasa, S. (2002). The Norwegian Brief Pain Inventory Questionnaire: Translation and validation in cancer pain patients. *Journal of Pain and Symptom Management*, 24(5), 517–525.
- Knoke, D., & Bohrnstedt, G.W. (1994). *Statistics for social data analysis* (3rd ed.). Itasca, IL: F.E. Peacock.
- Lai, Y.H., Keefe, F.J., Sun, W.Z., Tsai, L.Y., Cheng, P.L., Chiou, J.F., et al. (2002). Relationship between pain-specific beliefs and adherence to analgesic regimens in Taiwanese cancer patients: A preliminary study. *Journal of Pain and Symptom Management*, 24(4), 415–423.
- Liang, S.Y., Yates, P., Edwards, H., & Tsai, S.L. (in press). Opioid-taking tasks and behaviours in Taiwanese outpatients with cancer. *Journal of Clinical Nursing*.
- Lin, C.C. (1999). Disclosure of the cancer diagnosis as it relates to the quality of pain management among patients with cancer pain in Taiwan. *Journal of Pain and Symptom Management*, 18(5), 331–337.
- Lin, C.C. (2001). Congruity of cancer pain perceptions between Taiwanese patients and family caregivers: Relationship to patients' concerns about reporting pain and using analgesics. *Journal of Pain and Symptom Management*, 21(1), 18–26.
- MacCallum, R.C., Widaman, K.F., Zhang, S., & Hong, S. (1999). Sample size in factor analysis. *Psychological Methods*, 4(1), 84–99.
- Miaskowski, C., Dodd, M.J., West, C., Paul, S.M., Tripathy, D., Koo, P., et al. (2001). Lack of adherence with the analgesic regimen: A significant barrier to effective cancer pain management. *Journal of Clinical Oncology*, 19(23), 4275–4279.
- Nicholas, M.K. (2007). The pain self-efficacy questionnaire: Taking pain into account. *European Journal of Pain*, 11(2), 153–163.

- Nunnally, J.C. (1978). *Psychometric theory* (2nd ed.). New York: McGraw-Hill.
- Nunnally, J.C., & Bernstein, I.H. (1994). *Psychometric theory* (3rd ed.). New York: McGraw-Hill.
- Ozdamar, K. (1999). *Statistical data analysis with standard statistical programs* (2nd ed.). Eskisehir, Turkey: Kaan Publishing.
- Pajares, F., Hartley, J., & Valiante, G. (2001). Response format in writing self-efficacy assessment: Greater discrimination increases prediction. *Measurement and Evaluation in Counseling and Development*, 33(4), 214.
- Radbruch, L., Loick, G., Kiencke, P., Lindena, G., Sabatowski, R., Grend, S., et al. (1999). Validation of the German version of the Brief Pain Inventory. *Journal of Pain and Symptom Management*, 18(3), 180–187.
- Reder, R.F. (2001). Opioid formulations: Tailoring to the needs in chronic pain. *European Journal of Pain*, 5(Suppl. A), 109–111.
- Reyes-Gibby, C.C., Ba Duc, N., Phi Yen, N., Hoai Nga, N., Van Tran, T., Guo, H., et al. (2006). Status of cancer pain in Hanoi, Vietnam: A hospital-wide survey in a tertiary cancer treatment center. *Journal of Pain and Symptom Management*, 31(5), 431–439.
- Riddell, A., & Fitch, M.I. (1997). Patients' knowledge of and attitudes toward the management of cancer pain. *Oncology Nursing Forum*, 24(10), 1775–1784.
- Schumacher, K.L., Koresawa, S., West, C., Hawkins, C., Johnson, C., Wais, E., et al. (2002). Putting cancer pain management regimens into practice at home. *Journal of Pain and Symptom Management*, 23(5), 369–382.
- Simoni, J.M., Frick, P.A., & Huang, B. (2006). A longitudinal evaluation of a social support model of medication adherence among HIV-positive men and women on antiretroviral therapy. *Health Psychology*, 25(1), 74–81.
- Sweeney, S., Taylor, G., & Calin, A. (2002). The effect of a home based exercise intervention package on outcome in ankylosing spondylitis: A randomized controlled trial. *Journal of Rheumatology*, 29(4), 763–766.
- Thomas, J.J., Shuford, D.M., Duke, J.C., & Cipriani, D.J., III. (2007). Development and psychometric properties of the Self-Efficacy Scale for transfers for caregivers of children requiring transfer assistance. *Archives of Physical Medicine and Rehabilitation*, 88(4), 481–488.
- Wang, X.S., Mendoza, T.R., Gao, S.Z., & Cleeland, C.S. (1996). The Chinese version of the Brief Pain Inventory (BPI-C): Its development and use in a study of cancer pain. *Pain*, 67(2–3), 407–416.
- Yates, P., Edwards, H., Nash, R., Aranda, S., Purdie, D., Najman, J., et al. (2004). A randomized controlled trial of a nurse-administered educational intervention for improving cancer pain management in ambulatory settings. *Patient Education and Counseling*, 53(2), 227–237.
- Zeppetella, G. (1999). How do terminally ill patients at home take their medication? *Palliative Medicine*, 13(6), 469–475.