Title:

The Development and Preliminary Testing of an Instrument for Assessing Fatigue Self-management Outcomes in Patients with Advanced Cancer

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The authors declare that they have no conflicts of interest.

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Abstract:

Background: Fatigue is one of the most distressing and commonly experienced symptoms in patients with advanced cancer. Although the self-management (SM) of cancer-related symptoms has received increasing attention, no research instrument assessing fatigue SM outcomes for patients with advanced cancer is available.

Objectives: to describe the development and preliminary testing of an interviewer-administered instrument for assessing the frequency, and perceived levels of effectiveness and self-efficacy associated with fatigue SM behaviors in patients with advanced cancer.

Methods: The development and testing of the Self-efficacy in Managing Symptoms Scale-Fatigue Subscale for Patients with Advanced Cancer (SMSFS-A) involved a number of procedures: item-generation using a comprehensive literature review and semi-structured interviews, content validity evaluation using expert panel reviews, and face validity and test-retest reliability evaluation using pilot testing.

Results: Initially, 23 items (22 specific behaviors with one global item) were generated from the literature review and semi-structured interviews. After two rounds of expert panel review, the final scale was reduced to 17 items (16 behaviors with one global item). Participants in the pilot test (n=10) confirmed that the questions in this scale were clear and easy to understand. Bland-Altman analysis showed agreement of results over a one-week interval.

Conclusions: The SMSFS-A items were generated using multiple sources. This tool demonstrated preliminary validity and reliability.

Implications for practice: The SMSFS-A has the potential to be used for clinical and research purposes. Nurses can use this instrument for collecting data to inform the initiation of appropriate fatigue SM support for this population.

Keywords:

Advanced cancer, Fatigue, Instrument development, Reliability, Self-efficacy, Self-management, Validity

Introduction

The importance of self-management (SM) as a health care model is increasingly recognised in caring for people with chronic conditions. The National Cancer Research Institute in the UK proposed that SM research is a key area for the innovative approaches to address complex symptoms, including non-pharmacological approaches to symptom management.¹ In SM models, health professionals focus on what they, the caregivers and the health system can do to enable the patient to care their own condition.

Self-efficacy theory has often been used in recent cancer care research as a framework to explain behavioural responses to cancer²⁻⁶. For example, Porter cross-sectionally surveyed 30 patients with newly diagnosed lung cancer, reporting that patients with higher level of perceived self-efficacy in managing their symptoms had lower symptom severity, including pain². Other recent work undertaken by Liang and colleagues (2008) revealed the relationship between opioid-taking perceived self-efficacy and opioid taking adherence and pain levels amongst patients with cancer³⁻⁵. Other research evidence suggests that perceived self-efficacy is a valuable construct that can explain the level of pain^{5, 6}, pain behaviors⁵, levels of fatigue⁶, and symptom experiences⁶ of patients with cancer. The purpose of this study is to describe the development of an instrument to measure self-efficacy associated with SM behaviors associated cancer-related fatigue.

Cancer-related fatigue (CRF) is one of the most frequently experienced and distressing symptoms reported by cancer patients.^{7, 8} The management of CRF is complex and often involves a combination of pharmacological and non-pharmacological strategies. Regardless of which strategies are used, most of these management strategies require behavioral responses

on the part of the patient (e.g. maintaining sleep hygiene, exercise and energy conservation). There are ongoing research efforts to provide an evidence base to support the use of these strategies both individually (e.g. exercise interventions alone) or in combination (e.g. a behavioral interventions involving a number of strategies). The behaviors required to manage fatigue can involve a collaborative effort between patients and health professionals (e.g. through taking prescribed medications), or can be self-initiated without any prompting by their health professionals (e.g. through engaging in behavioral strategies such as modifying their diet).

Some research has been undertaken to explore self-management behaviours for managing fatigue in patients with cancer undergoing active treatment with curative intent⁹⁻¹¹, there is however a lack of information concerning such issues in patients with advanced disease¹². Fatigue in patients with advanced cancer can potentially have quite different aetiologies compared to patients at earlier stages of their disease. As their disease progresses, they can also experience reduced cognition and functional status that impedes their ability to self-manage. To date, there has been limited evidence regarding the behaviours patients with advanced cancer perform in managing fatigue and the effectiveness of those behaviours from the patient's perspective. Gaining a deeper understanding of such behaviours in this patient group will assist with the design of appropriate patient-centred interventions for this population¹³.

Although a number of CRF measurements are available in the literature,¹⁴⁻¹⁷ these measurements focus on the intensity and interference or distress levels of fatigue. A comprehensive instrument to assess various components of SM behaviors is not available. The issues associated with SM support are complex. For effective SM support and measurement to occur, health professionals must understand the patient's perspective,¹⁸ as well as accurately

evaluate the SM outcomes of their intervention. In particular, Dodd et al. suggested several practical issues that are critical to effective SM support and measurement.¹⁸ These issues include, but are not limited to: What behaviors do patients choose to engage in? When and how often do they engage in them? Are the behaviors effective or ineffective from the patient's perspective (if effective, to what extent)? What are the perceived self-efficacy levels of patients as they attempt to manage their health issue (i.e. fatigue)?

This study aimed to develop an instrument entitled the Self-efficacy in Managing Symptoms Scale- Fatigue Subscale for Patients with Advanced Cancer (SMSFS-A) which evaluates the level of perceived self-efficacy, the frequency and the perceived effectiveness of fatigue management strategies from the perspective of patients with advanced cancer.^{19, 20}

Theoretical Framework

Perceived self-efficacy is a social-cognitive theoretical construct, that was first conceptualized by Bandura in 1977.²¹ The strength of perceived self-efficacy refers to judgment of how certain one is of one's ability to perform a specific task in these situations.²¹ Bandura proposed that Social Cognitive Theory views human functioning as determined by the dynamic interaction of personal, behavioral, and environmental influences.^{22, 23} Given that such personal, environmental and behavioral factors are often amenable to intervention, a person's behavior can change. Bandura further suggests that outcome expectations in SM are based largely on the individual's self-efficacy expectations.^{22, 23} The outcomes people anticipate generally depend on their judgments of how well they will be able to perform the behavior. Social cognitive theory purports that the higher the individual's efficacy-expectation levels towards a particular behavior, the greater will they have to succeed in achieving a task.^{22, 23} While people might believe that they can achieve tasks, people still cannot perform tasks beyond their

abilities.²⁴ People with higher perceived self-efficacy believe they can take action to solve a problem, and they are more committed to their actions.²⁴ In contrast, people with lower perceived self-efficacy expectations are less likely to take action to solve a problem.²⁴ According to Bandura (1998), understanding the factors influencing a person's behavior is required to overcome the impediments to new lifestyle choices.²⁵

Methods

The development of the SMSFS-A was part of a study that aimed to examine fatigue SM behaviors in patients with advanced cancer and the factors influencing these behaviors²⁶. This part of the study was conducted in three phases: (1) item generation using data from a comprehensive literature review and semi-structured interviews, (2) content validity evaluation using expert panel reviews and (3) feasibility evaluation of an instrument assessing SM behaviors associated with fatigue in patients with advanced cancer. "Ethics approvals were granted by the Royal Brisbane and Women's Hospital and the Queensland University of Technology University Human Research Ethics Committees.

Concerning the construction of self-efficacy scales, Bandura argued that one cannot be all things.²⁷ People have different levels of efficacy in different situations; their efficacy belief system is not a global trait. To serve the purpose of a specific scale, items should therefore not be expressed in general terms, which creates ambiguity about exactly what is being measured. According to Bandura²⁷, items for measuring perceived self-efficacy should focus on specific situations and outcome expectations. For example, "When you have other time commitments, how certain you are that you can get yourself to perform your exercise routine regularly?" The management of cancer-related fatigue involves a wide variety of behaviors. It may include

exercise, managing eating habits, resting, energy conservation, relaxation.,²⁸ Therefore, the SMSFS-A couched all questions in the context of advanced cancer.

Semi-structured interviews

During the first phase of tool development, semi-structured interviews were conducted to scope the range of activities patients with advanced cancer undertake to self-manage their fatigue. Participants were recruited from the largest tertiary cancer care centre in Queensland, Australia. The sampling frame for this phase of the study was limited to all individuals diagnosed with advanced cancer who fulfilled the following recruitment criteria: diagnosed with at least one distant metastasis; reported an average fatigue intensity score of 4 or above on a 0-10 numerical rating scale in the past 7 days; were over 18 years of age; were, in the opinion of the treating team, able to provide informed consent; had completed first-line therapy since the first diagnosis of cancer; and had a life expectancy of more than two months. Patients were excluded if they were, in the opinion of the treating team, unable to provide informed consent; were unable to speak and understand English; or were deemed by treating clinicians to be “too ill” or had “altered cognition” and not able to participate.

The interview questions were guided by a question prompt-list that included a number of SM behaviors associated with fatigue as identified in the literature review. It was possible that patients performed these behaviors as general coping behaviors, and that they were not specifically for managing fatigue. Therefore, participants were asked specifically if they undertook certain behaviors to manage fatigue and whether it was useful for reducing it. Where any doubt arose, further prompts encouraged the participants to clarify whether their responses were specific to their management of fatigue, as opposed to general coping.

Sample size

There are no universal rules that determine the sample size of qualitative studies.^{29, 30} Some qualitative studies use a data saturation method for determining the sample size, but its use is controversial.³¹ Marshall (1996) suggested that an appropriate sample size for a qualitative study is one that adequately answers the research question.³¹ Sandelowski (1995) argued that adequate sample size in qualitative research method is ultimately a matter of the judgement of the researcher, who is best placed to evaluate the quality of the information collected against the uses to which it will be put.³² For this reason, a convenience sample of ten patients with advanced cancer with a fatigue severity score of four or above was interviewed.

Analysis of the semi-structured interviews

The data obtained from the interviews were audio-recorded and transcribed. Data were managed with the use of the audio and transcribing functions of the NVivo software, and a number of manual coding procedures.³³ Without sufficient current knowledge of SM behaviors in patients with advanced cancer, a content analysis was conducted to gain knowledge about what patients with advanced cancer do to manage fatigue.³⁴ In this study, the analysis of data in this stage pragmatically focussed on generalizability (i.e. *identifying codes representing patients' SM behaviors*), rather than identifying patterns (i.e. *why patients perform certain behaviors*).³⁵ The procedures for content analysis in the study were guided by Johnson and LaMontagne.³³

Content validity assessment

Content validity is a crucial factor in instrument development, in that it addresses whether items within an instrument adequately measure a desired domain of content.^{36, 37} To ensure the SMSFS-A had content validity in patients with advanced cancer; five experts were contacted

and asked if they would participate as expert panellists. Criteria for selection of the panellists included having: (i) a minimum education levels of Masters degree, (ii) a minimum three years of previous experience in cancer nursing, or previous experience with instrument development for the assessment of SM in patients with cancer. These criteria were consistent with the recommendations of Grant and Davis.³⁶ A minimum number of three experts was used as advised by Lynn in using the Content Validity Index (CVI) method to assess content validity.³⁷ To enhance the accuracy, appropriateness, and relevance of the items in patients with advanced cancer, the panellists were asked to add, delete, or alter questions to further modify the instrument, as they felt were applicable to the context of SM associated with fatigue in this cohort. The evaluation also included suggestions for format, clarity of items and relevance of items. Items that did not achieve a CVI for item clarity of 1 were modified or deleted.

Pilot test

This pilot test aimed to assess the feasibility and the reproducibility of the instrument.³⁸ The setting, sampling frame and participant recruitment procedures for this stage was the same as that for the semi-structured interviews. Feasibility was assessed by measuring the time needed to complete the assessment tool, and asking patients about their views on the clarity of the questions, whether they could understand all items, whether the questions were easy to answer, and what other SM behaviors they undertook for fatigue that were not yet included in the tool. Further adjustments of the items were then made according to the comments given by patients. After one week patients were contacted via the telephone to complete the questionnaire again, in order to examine the reproducibility of results. The one-week interval was chosen as recommended by Summers (1993), who argued that the second test should not be more than two weeks after the first test.³⁹ This is to ensure that patients give a valid measurement in the second test without necessarily remembering the answers that were given during the first test.

After the first two phases of development, the revised SMSFS-A was piloted with a convenience sample of 10 participants. It was expected that a sample of 10 participants would provide a valid analysis of measurement error for the purpose of evaluating reproducibility. This analysis would estimate the mean error and its confidence interval. Without any knowledge about an *a priori* difference, or how big a difference in error constitutes too much error, no sample size could be estimated.

Data analysis of the pilot test

All analyses were conducted using SPSS version 17. For test-retest reliability, Bland and Altman's measurement error calculation over a one-week interval (or within subject standard deviation) was calculated using the two main outcomes of the SMSFS-A (i.e. "the overall level of self-efficacy of SM for fatigue" and "the overall level of effectiveness of SM for fatigue").⁴⁰

Results

Phase 1. Item generation using data from a comprehensive literature review and semi-structured interviews, and the format and scaling of the SMSFS-A

Our comprehensive review of the current literature related to fatigue management in patients with advanced cancer was published elsewhere.²⁸ A number of pharmacological and non-pharmacologic management strategies (including exercise, sleep/rest, energy conservation, complementary therapies, and psychosocial interventions) were identified in this review.

Ten patients with advanced cancer (five women and five men) from the largest tertiary cancer care center in Brisbane, Australia participated in the semi-structured interviews. The median age of the sample was 67 (range 44-81). These patients had diagnoses including cancers of the breast, lung, ovarian, prostate and head and neck. All ten patients had at least one distant

metastatic disease and had completed first-line treatments for their cancer. The educational levels of these patients varied from having completed primary schooling to having completed tertiary education. Table 1 provides a summary of the socio-demographic and medical/clinical characteristics of participants.

Insert Table 1 about here.

Nine categories of behaviors reflecting the core behaviors patients undertake for managing fatigue were identified; namely rest; managing medications; doing relaxing tasks; exercise; keeping busy; managing workload; optimising nutritional intake; keeping positive; and accepting help from others. A summary of categories (of behaviors) and coded actions (individual behaviors) is presented in Table 2.

Insert Table 2 about here.

Phase 2. Expert panel reviews: content validity evaluation

Based on the results of the comprehensive literature review and the semi-structured interviews, the first draft of the SMSFS-A including 23 initial items (22 specific behaviors and one global item) was created.

The format and scaling of the SMSFS-A

The SMSFS-A was designed to assess three domains of SM associated with fatigue in patients with advanced cancer. For each item (SM behavior), three domains including the frequency of using the SM behavior, the perceived levels of effectiveness and the levels of perceived self-

efficacy associated with the SM behaviors, are assessed. If the patient used the particular behavior in the previous seven days, they would subsequently be asked to rate the frequency, effectiveness and the confidence levels associated with the behavior. The word confidence was used in the questionnaire as “self-efficacy” is not a commonly known word to patients. If the patient did not use the behavior in the previous week, the particular behavior was not assessed. This method is congruent with our previous work in assessing symptom SM in patients with cancer.⁴¹

The scale of frequency was rated as 0 = not used at all, 1 = occasionally (once a twice a week), 2 = often (3-4 times a week), 3 = very often (5-6 times a week) and 4 = all the time (7 times or more a week). The levels of effectiveness of the behaviors in relieving fatigue were rated from 0 to 10, with “0” indicating “not at all effective” and “10” indicating “extremely effective”. For the measurement of perceived self-efficacy, individuals rated the strength of their belief in their ability to execute a series of items. A single-judgment format was selected for this instrument; whereby individuals could rate the strength of their perceived efficacy from “0” indicating “not confident at all” to “10” indicating “extremely confident” for every item in the scale. Each item in the scale was rated for the frequency of use, the levels of perceived effectiveness and the levels of perceived self-efficacy associated with the behavior.

Other than specific SM behaviors, two additional questions assessed the global level of effectiveness of fatigue SM behaviors and the global level of confidence. These items were: “Overall, over the past 7 days, how would you rate your effectiveness in relieving your fatigue” (0 = not effective at all, 10 = extremely effective); and “Overall, over the past 7 days, how would you rate your confidence in managing fatigue” (0 = not confident at all, 10 = extremely confident).

Following the evaluation of the first expert panel review, one item was retained; 14 items were amended and two items were added. One of the expert panellists raised a safety concern regarding the inclusion of the item that elicited medication-related behaviors due to the lack of efficacy of most prescribed medications for managing fatigue at the time of the panel review. Although the SMSFS-A was designed to be a measurement tool rather than an educational tool that advises the use of any of the behaviors, it was suggested that some interviewees might misunderstand the purpose of the tool and adopt the included behaviors being assessed. Therefore, actions associated with taking medications were removed. Subsequently, the amended version of the SMSFS-A containing 18 items (17 behaviors and one global item) was sent to the expert panel for the second round of review as recommended by Lynn³⁷. The final version of the SMSFS-A achieved a CVI of 1 for relevance. With the feedback of the expert panel regarding clarity of the items, one further item was removed; five were amended and 11 were retained without further amendment. Therefore, the final tool contains 17 items (16 specific behaviors with one global item) (see Table 3).

Insert Table 3 about here.

Phase 3. Pilot test: feasibility and test-retest reliability evaluation

Ten patients with advanced cancer (nine women and one man) from the same tertiary cancer care center in Brisbane, Australia participated in the pilot test. The mean age of the sample was 62.6 ($SD= 9.1$). At baseline, five of the participants were inpatients and five were outpatients. These patients had diagnoses including breast cancer and lung cancer. All ten patients had at least one distant metastasis and had completed first-line treatments for their cancer. The

educational levels of these patients varied from having completed primary schooling to having completed tertiary education. The mean Australian Karnofsky Performance Status (AKPS) for this sample was 74 ($SD=18.38$). The mean fatigue numerical analogue score on average over the past seven days was 5.6 ($SD=1.71$). Table 4 summarises the socio-demographic and medical/clinical characteristics of participants in the pilot test at baseline.

The average time to complete the survey at Time 1 was 11 minutes (7.5 minutes for Time 2). Ten participants completed Time 1 surveys, and nine participants completed Time 2 surveys. One participant did not complete the Time two survey as she was too fatigued and was not able to concentrate. This participant did manage to answer two questions that asked “Overall, over the past 7 days, how would you rate your effectiveness in relieving your fatigue?” and “Overall, over the past 7 days, how would you rate your confidence in managing your fatigue?” No further adjustments of the items were made at this time according to the comments given by patients.

The two main outcomes of the SMSFS-A (the self-perceived overall effectiveness levels and the overall self-efficacy levels for fatigue SM) were selected for the reproducibility analysis, one week apart. The Bland-Altman plots indicated agreement between initial and subsequent pilot test outcomes over a 1-week interval (see Figures 1 and 2). These preliminary results demonstrated acceptable agreement between the initial and follow up tests.

Insert Figures 1 and 2 about here

Discussion

The interview data from this study revealed that participants performed a range of SM behaviors to manage fatigue. The reported behaviors were broadly categorised into five groups of behaviors: activities, complementary and alternative therapies, cognitive, psychological, and nutrition. According to Bandura²⁷, items for measuring perceived self-efficacy should focus on specific situations. These broad categories of behaviors associated with fatigue have been reported previously in our systematic review of the literature.²⁸ It is also expected that understanding the factors influencing a person's own behavior is required to overcome the impediments to form new lifestyle choices.²⁵ The tool developed in this study allows for measurement of various factors influencing the lifestyle choices corresponding to these broad categories of behavior related to fatigue management in patients with advanced cancer. While it is a common belief that “nothing can be done” for managing fatigue in this patient group⁴²,⁴³, the findings suggest otherwise. Indeed, patients do engage in SM activities for their fatigue, even at advanced stages of their disease. Moreover, these findings confirm that patients with advanced disease often spontaneously engage in a number of behaviors with or without the prescription of the health professionals.

Hoffman et al. published a series of studies evaluating how nurses can enhance perceived self-efficacy and in turn optimize patient outcomes.^{44, 45} Hoffman et al. propose that patients with cancer make decisions about their care, which are decisions on what and how much they are going to use SM behaviors.⁴⁴ For example, patients experiencing CRF make decisions on how long to rest, whether to exercise and the extent to which they would carry out other prescribed interventions to manage fatigue.⁴⁴ Different individuals have different levels of perceived control and therefore behave differently in response to the symptom experience. SM support focuses on enhancing a person's perceived self-efficacy for symptom management through modifying how a person thinks, feels, motivates and performs in order to strengthen a person's

symptom control.⁴⁴ The findings of this study support Hoffman et al's view that patients engage in a range of behaviors associated with CRF. The scale developed in this study can potentially provide a useful tool for understanding patients' self-efficacy in engaging in these behaviors, and in turn more effectively targeting of interventions.

To the best of our knowledge, this study is the first to develop and pilot-test a tool for measuring components of fatigue SM specifically for patients with advanced cancer. Simultaneous with this study, Hoffman and colleagues developed an instrument known as Measurement of Perceived Self-efficacy for Fatigue Self-management (PSEFSM).⁴⁵ Although both the PSEFSM and the SMSFS-A were based on similar theoretical premises, there are two major differences between the two instruments. Firstly, the PSEFSM is different to the SMSFS-A in that it measures perceived self-efficacy as an overall construct whereas the SMSFS-A depicts perceived self-efficacy as a construct consisting of a number of distinct behaviors used by the patient. Secondly, the SMSFS-A was specifically designed for patients with advanced cancer, whereas the PSEFSM was designed for patients with cancer in general. Advances in assessing fatigue SM are expected to enable the development of interventions to enhance patient perceived self-efficacy related to fatigue SM, and subsequently fatigue severity.⁴⁵

The SMSFS-A potentially provides a useful measure of SM in patients with advanced cancer for a symptom that is frequently occurring, persistent and severe. In the provision of fatigue SM support, health professionals ideally seek to understand the patient's perspectives, rather than dictating behavioral changes.^{46, 47} To enable greater understanding of the complexity of SM behaviors in this population, further testing of factors associated with these fatigue SM components is required. Such investigations can inform the design of fatigue SM interventions. This instrument also has potential for use by clinical nurses undertaking collaborative care

planning with the patient. The understanding of whether certain behaviors are effective or ineffective (and if so, to what extent) and the patient's perceived self-efficacy levels might prompt effective perceived self-efficacy enhancement interventions. In particular, resources could be directed to those behaviors that are recommended by evidence-based guidelines and behaviors that patients are not confident to use.

The generalizability of the items of the SMSFS-A might be limited to a non-culturally diverse population. The sample of both the semi-structured interviews and the pilot test were all Caucasian Australians. The pilot test included patients who were attending treatments or receiving care at a tertiary cancer centre, with very low co-morbidity scores. These means that the items generated in this process may mean that further testings are required to ensure generalizability of the items. It also became apparent in the review process that the wording used might not be commonly used in countries other than Australia. Another limitation of this study is that reliability testing using Cronbach's alpha and the construct validity of the SMSFS-A could not be evaluated due to limited sample size. As discussed earlier, the SMSFS-A was developed to measure components of SM respective to distinct behaviors, rather than to measure outcomes as a single theoretical construct. Lastly, the SMSFS-A is lengthy, comprising 53 numerical rating scales for 17 items for distinct behaviors and two global items. The lengthiness of this tool might limit its use in routine clinical use. However, future work can determine if components of the tool can be reduced to allow for routine clinical use.

Despite these limitations, the SMSFS-A usefully breaks down the assessment of SM components specific to the frequency and effectiveness of behaviors that patients use. In the collaborative planning process in SM models, the patient set goals together with the health professional in undertaking specific strategies. The SMSFS-A could potentially be useful in

this process, enabling health professionals to intervene to enhance patient efficacy and provide evidence-based information and skills training. Documentation of these outcomes also allows health professionals to evaluate previous interventions, facilitate a conversation and inform subsequent interventions.

Conclusion

Fatigue is a prevalent symptom in advanced cancer. Support for this distressing symptom can be informed by understanding the complexity of components of SM including the frequency, perceived effectiveness, and perceived self-efficacy of fatigue SM behaviors. Although this tool is not ready for routine use, this study provides preliminary results that demonstrate the potential of SMSFS-A for measuring SM concerning this population.

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Table 1. Sample Characteristics of the Semi-structured Interviews (n=10) and the Pilot Test (n=10)

Characteristics	Phase I. Participants (n=10)	Phase III Participants (n=10)
Age (years)	<u>Median (Range)</u>	<u>M (SD)</u>
	67 (44-81)	62.6 (9.10)
Gender	<u>N (%)</u>	<u>N (%)</u>
Male	5 (50%)	1 (10%)
Female	5 (50%)	9 (90%)
Ethnicity		
Caucasian	10 (100%)	8 (80%)
African	0	0
Asian	0	1 (10%)
Aboriginal/Torres Strait Islanders	0	0
Others	0	1 (10%)
Education		
Completed primary schooling	3 (30%)	1 (10%)
7-12 years	2 (20%)	2 (20%)
Completed high school	3 (30%)	3 (30%)
Post-secondary school	0 (0%)	4 (40%)
Tertiary education	2 (20%)	0
Living Arrangement		
Live with partner	5(50%)	5(50%)
Live with other family member or friend	2 (20%)	2 (20%)
Alone	3 (30%)	3 (30%)
Income (per annum)		
<20,000	7 (70%)	4 (40%)
20,001-30,000	3 (30%)	4 (40%)
30,001-40,000	0	0
40,001-50,000	0	1 (10%)
50,001-60,000	0	0
>60,000	0	1 (10%)

Marital status		
Married	5 (50%)	4 (50%)
Divorce	3 (30%)	3 (30%)
De facto	0 (0%)	0
Widowed	1 (10%)	2 (10%)
Single	1 (10%)	1 (10%)
Primary tumour site		
Lung	1 (10%)	6 (60%)
Breast	2 (20%)	4 (40%)
Colon	2 (20%)	0
Head and Neck	2 (20%)	0
Prostate	2 (20%)	0
Ovarian	1 (10%)	0
Current anti-cancer therapy		
Chemotherapy	6 (60%)	0
Radiotherapy and targeted therapy	1 (10%)	3 (10%)
Chemotherapy and targeted therapy	1 (10%)	1 (10%)
Targeted therapy only	1 (10%)	1 (10%)
Not current anti-cancer therapy	1 (10%)	5 (10%)
		<u><i>M (SD)</i></u>
Australian Karnofsky Performance Scale	NC	74 (18.38)
Fatigue NAS	NC	5.6 (1.71)
		<u><i>Median (Range)</i></u>
Charlson Comorbidity Index:	NC	0 (0-6)

Note. NC = Did not collect

Table 2. Categories of Behaviors associated with Cancer-Related Fatigue

Broader categories of behaviors	Categories of behaviors	Behaviors/ actions
Cognitive	Doing relaxing tasks/ Distraction	<ul style="list-style-type: none"> • reading magazines • watching TV • reading • doing puzzles • reading newspaper
Activity	Exercise	<ul style="list-style-type: none"> • walking • jogging • doing weights • participate in a walking program
	Keeping busy	<ul style="list-style-type: none"> • going to work • spending time with loved ones • spending time with friends • doing household chores
	Managing workload	<ul style="list-style-type: none"> • pacing oneself • taking breaks during a task • conserving energy for later tasks
	Accepting help from others	<ul style="list-style-type: none"> • delegating tasks • receiving home help service • sharing housework with family • accepting help from family
	Rest	<ul style="list-style-type: none"> • taking naps • sleeping • lying down • sitting
Nutrition	Optimising nutritional intake	<ul style="list-style-type: none"> • taking nutritional supplement • maintaining healthy/ balanced diets
Medication	Managing medications	<ul style="list-style-type: none"> • taking medications • taking pain relief to indirectly manage fatigue • reducing the dose of pain relief

Table 3. Items (Behaviors) included in the Final SMSFS-A

Fatigue Self-management Behaviors	
Activities	
	Take short sleeps during the day (fall asleep for less than 3 hours)
	Rest during the day (without falling asleep)
	Do aerobic exercise (e.g. walking/ stair climbing/ swimming)
	Do stretching exercises
	Do strength exercises
	Delegate tasks to others
	Pace your activities throughout the day
	Do things to improve your sleep at night (e.g. reduce noise and light; avoid caffeine before bed)
Complementary or alternative therapies	
	Use complementary or alternative therapies (e.g. acupuncture/ aromatherapy/ massage/ reflexology)
Cognitive	
	Do things that distract you from your fatigue (e.g. hobbies/socialising)
	Plan your activities to make the most of your energy levels through the day
Psychological	
	Do relaxing things (e.g. music and reading)
	Talk to someone about your fears and concerns about fatigue
Nutrition	
	Eat a balanced diet
	Drink beverages with caffeine (e.g. coffee/tea/Coke/Red-Bull®)
	Drink nutritional supplements (e.g. high protein/ vitamin drinks)
Overall	
	Overall, over the past 7 days, how would you rate your effectiveness in relieving your fatigue?
	Overall, over the past 7 days, how would you rate your confidence in managing your fatigue?

Note. The three domains of outcomes (Frequency of behavior use and perceived levels of effectiveness and self-efficacy) are assessed for all 17 behavior-specific items “over the past 7 days”.

Table 4. Sample Characteristics of the Pilot Test (n=10)

Characteristics	Participants (n=10)
Gender	<u>N (%)</u>
Male	1 (10%)
Female	9 (90%)
Ethnicity	
Caucasian	8 (80%)
African	0
Asian	1 (10%)
Aboriginal/Torres Strait Islanders	0
Others	1 (10%)
Education	
Completed primary schooling	1 (10%)
7-12 years	2 (20%)
Completed high school	3 (30%)
Completed tertiary education	4 (40%)
Living Arrangement	
Live with partner	5(50%)
Live with other family member or friend	2 (20%)
Alone	3 (30%)
Income (per annum)	
<20,000	4 (40%)
20,001-30,000	4 (40%)
30,001-40,000	0
40,001-50,000	1 (10%)
50,001-60,000	0
>60,000	1 (10%)
Marital status	
Married	4 (50%)
Divorce	3 (30%)
Widowed	2 (10%)
Single	1 (10%)
Primary tumour site	
Lung	6 (60%)
Breast	4 (40%)
Colorectal	0
Prostate	0
Current anti-cancer therapy	
Chemotherapy	0
Radiotherapy only	3 (10%)
Chemotherapy and radiotherapy	1 (10%)
Targeted therapy only	1 (10%)
Not current anti-cancer therapy	5 (10%)
	<u>M (SD)</u>
Age (years)	62.6 (9.10)
Australian Karnofsky Performance Scale: Mean	74 (18.38)
Fatigue NAS	5.6 (1.71)

Charlson Comorbidity Index:	<u>Median (Range)</u>
	0 (0-6)

Note. NAS= Numeric Analogue Scale; *M*=Mean; *SD*=Standard Deviation.

Comparing effectiveness levels one week apart

Figure 1. Bland-Altman Plots (n=10) to establish the agreement between test-retest for the self-perceived overall effectiveness levels for fatigue self-management. The mean difference (solid line) and the limit of agreement (broken lines) are indicated.

Figure 2. Bland-Altman Plots (n=10) to establish the agreement between test-retest for the self-perceived overall self-efficacy levels for fatigue self-management. The mean difference (solid line) and the limit of agreement (broken lines) are indicated.