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The Development and Testing of an Instrument for Perceived Self-Efficacy for Fatigue Self-Management

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Abstract

Background—Persons with chronic illness commonly report fatigue. Measurement of perceived self-efficacy for fatigue self-management (PSEFSM) is essential if fatigue is to be monitored and enhanced to improve physical functional status (PFS).

Objective—Describe the development and testing of the PSEFSM Instrument.

Methods—The PSEFSM Instrument was incorporated into two randomized control trials for secondary analysis ($N = 298$), 63 persons with lung cancer and 235 persons with other cancer diagnoses undergoing a course of chemotherapy.

Results—Evidence for construct validity and generalizability was supported through hypotheses testing of the mediation pathway from fatigue to PFS through PSEFSM with results indicating support for partial mediation. Structural modeling indicated a good model fit that further supported the construct validity of the PSEFSM Instrument.

Conclusions—The instrument provides a reliable and valid measure of PSEFSM that could be used in research to facilitate the development of interventions to increase perceived self-efficacy to achieve optimal symptom self-management.

Implications for Practice—The PSEFSM Instrument is brief and easy to complete which results in a low response burden for persons who are already fatigued providing for regular use in transdisciplinary research and practice settings. This is important since the use of this instrument can impact how we partner with our patients to better understand how to manage this troublesome symptom, fatigue.

Fatigue is a symptom that accompanies many troublesome symptoms in chronic illness populations that patients are expected to self-manage. While therapies exist for patients to relieve these symptoms, all too often there are cognitive factors that interfere with their ability to manage their symptoms. Perceived self-efficacy (PSE) for symptom self-management, a person's perception in their ability to manage their symptoms, is an important consideration in patient symptom self-management. However, limited research exists on the impact of PSE on symptom self-management in fatigue. Perceived self-efficacy is specific to the situation and to date no valid, reliable measure exists that evaluates a person's PSE for fatigue. The purpose of this paper is to describe the development and testing of a measure for PSE for fatigue self-management (PSEFSM).

Physical functional status (PFS) is a pivotal patient outcome that is greatly impacted by symptoms and symptom management. Physical functional status is defined as the physical activity that people accomplish in the normal course of their lives to meet basic needs, fulfill usual roles, and maintain their health and well-being [1]. Fatigue is a common severe symptom reported across multiple chronic illness populations such as Parkinson's disease [2], multiple sclerosis [3], chronic heart failure [4], chronic obstructive pulmonary disease [5], stroke [6], human immunodeficiency disease [7], end-stage renal disease [8], and cancer [9, 10]. The fatigue experience of persons with chronic illness differs from the fatigue experience of healthy individuals in that it is not proportional to recent activity and it interferes with usual functioning [11–18]. Fatigue has been studied in many different populations with chronic illness [19]. Additionally, fatigue adversely impacts the other symptoms that negatively affects the symptom experience [20–24]. Despite the wide scientific recognition of the prevalence, severity, and significant clinical impact of fatigue, there exists no “gold standard” treatment for fatigue [2, 11, 25, 26]. Over the past two decades Bandura's Self-Efficacy Theory [27] has generated increasing interest relative to its contribution to health behavior change to promote health in the face of chronic illness.

Bandura's Self-Efficacy

Theory Self-Efficacy Theory originates from Social-Cognitive Theory, which provides an explanation of complex human behavior [28]. Within this theory, particular attention is given to the notion that cognitive processes, how and what a person thinks, feels, and believes, affects how the person behaves [29]. Bandura's Self-Efficacy Theory proposes that persons who believe in their ability to manage their symptoms can achieve optimal PFS. According to Bandura [27], those persons with high levels of PSE are able to exert control over threats such as fatigue and other unpleasant symptoms to strive to improve their PFS. Thus, it is both the fatigue and a person's PSEFSM that determines the degree to which a person is vulnerable or empowered to meet the demands of their fatigue. Perceived self-efficacy is not a personality trait or merely holding a belief about a positive outcome. Rather, PSE is concerned with perceptions of ability to implement fatigue self-management behaviors to achieve performance outcomes such as optimal PFS [27]. A person's fatigue self-management efficacy perceptions are developed and altered through four main sources of information: direct mastery; vicarious experiences; persuasion by experts that one has the capabilities to achieve optimal PFS; and being able to realistically interpret symptoms from physiological and emotional states indicative of personal strengths and vulnerabilities to maximize PFS goals [27]. Self-Efficacy Theory provides direction for effective alteration of health behavior [30].

Self-Efficacy Theory In Persons with Chronic Illness

Perceived self-efficacy is theorized to influence PFS through symptom self-management behaviors, however, empirical testing of this notion in persons with chronic illness has been limited. Investigations measuring PSE for persons living with chronic illness have revealed a practical and reliable approach to assess a person's confidence in behavioral change to manage symptoms and improve functional abilities [31–34]. Likewise, studies have been conducted indicating that increased PSE has a positive impact on the lives of persons with chronic illness such as cancer [35–42]. However, few studies have been conducted focusing on PSE's relationship to symptom management for those with chronic illness. Since efficacy beliefs are behavior, task, and situation specific, every domain of interest, such as managing fatigue in persons with chronic illness, requires a different self-efficacy measure [27].

Using appropriate mesh terms, keywords and thesaurus terms via PubMed, MEDLINE, CINAHL, and PsycINFO (i.e., fatigue, symptoms, self-efficacy, self-management, chronic disease, chronic illness, Parkinson's disease, multiple sclerosis, chronic heart failure,

cardiac, chronic obstructive pulmonary disease, renal disease, human immunodeficiency virus, diabetes, and cancer), no studies investigated the role PSE plays in the management of fatigue to achieve optimal functional status for the general cancer population. Two studies concentrated on PSE in persons with lung cancer but neither of these had their primary focus on fatigue and the impact of PSEFSM on PFS [43, 44]. To effectively support the self-management of sentinel symptoms such as fatigue, health care professionals need to understand the central component of fatigue self-management — the self-appraisal (perception) of one's ability to manage fatigue. This paper attempts to fill this void by providing a valid means to measure PSEFSM in persons with chronic illness.

Measurement of Perceived Self-Efficacy

Bandura [27] posits that self-efficacy expectations are situation and context-specific. Self-efficacy expectations are among the most effective mediators since they influence the initial decision to perform a behavior and the effort and persistence of the behavior in the face of adversity. It is important to note that outcomes (e.g., optimal PFS) arise from actions (e.g., fatigue self-management behaviors), and the outcomes people anticipate depend largely on their perceptions of how well they will be able to perform in given situations [27]. Thus, in measuring PSE, people are presented with items describing different task demands and they rate the strength of their perception of their ability to implement behaviors. Bandura [27] emphasizes the importance of measuring PSE covering the upper limits of people's judgment in their abilities as well as degrees of strength below the upper limit. Items relative to PSE are phrased in terms of "can do" (perception of ability) rather than "will do" (perception of intention). Persons are asked to judge their current ability and not their potential future ability. Strength is rated using a unipolar scale, ranging from 0 to a maximum strength, and do not include negative numbers since judgment of complete inability (0) has no lower distinction.

Procedures for Instrument Development

Instrument Development

With the absence of an instrument to measure PSEFSM, a six-item subscale from the Lorig 20-item Arthritis Self-Efficacy Scale (ASE) was identified as a starting point to create the PSEFSM instrument. Lorig, Chastain, Ung, Shoor, and Holman [45] created the ASE to measure a person's PSE to cope with and/or ameliorate the consequences of chronic arthritis. The items in the ASE assess a patient's PSE to perform behaviors to cope with and/or ameliorate the consequences of chronic arthritis. Both exploratory factor analysis ($n = 144$) with subsequent confirmatory factor analysis using a separate sample ($n = 97$) demarcated three factors of the ASE: PSE for pain management; PSE for physical functioning; and PSE for coping with other symptoms [45]. Good internal coefficient alpha estimates for the three PSE subscales from both samples were reported ranging from 0.75 to 0.76 for pain management, 0.89 to 0.90 for physical functioning, and 0.87 for coping with other symptoms. Moreover, significant correlations were found between PSE scores and both present and future health status [45]. After completion of an educational arthritis management course, participants reported significant increases in PSE for pain management and controlling other symptoms. The increases in PSE for pain management and controlling other arthritis symptoms correlated with decreased levels of pain and depression. In summary, the ASE demonstrates sound reliability and validity as a measure of PSE beliefs to cope with and/or ameliorate the consequences of chronic arthritis. Like the assessment of PSE for the management of symptoms for persons with arthritis, assessment of PSE for the management of a priority symptom such as fatigue for persons with other chronic illnesses is very important. Unfortunately, research rigor in the measurement of PSE for symptom self-management of fatigue is lacking. The sound psychometric results and parallel theoretical

underpinnings (i.e., self-efficacy theory, self-management, and chronic illness population) of the ASE is an ideal starting point in the development of the PSEFSM instrument.

Description, Administration, and Scoring the PSEFSM Instrument

The items from Lorig and colleagues Coping with Other Symptoms ASE subscale were modified to focus on fatigue by replacing “other identified symptoms” with “fatigue” and removing references to arthritis to create the PSEFSM Instrument. The PSEFSM Instrument is a self-report measure containing six-items related to PSEFSM. On an 11-point scale (0–10, 10 very certain), respondents rate how confident they are in performing fatigue-managing behaviors (e.g., controlling fatigue; regulating activity to be active so as not to aggravate fatigue; doing something to help yourself feel better if you are feeling fatigued; compared to other people, managing fatigue during your daily activities; managing your fatigue so that you can do the things you enjoy doing; and, dealing with the frustration of fatigue). Summing the responses for each of the six-items and dividing that sum by six calculates the total score for the PSEFSM Instrument.

A panel of 13 content experts evaluated content validity for the PSEFSM Instrument. These experts were selected using the selection criteria established by Grant and Davis [46] and have experience in areas such as fatigue, clinical oncology, chronic illness, self-efficacy theory, research methods, statistics, or a combination of these. The panel of experts were provided with conceptual definitions, the measurement model, and a description of the population and setting in which the PSEFSM Instrument would be used [46]. The expert panel members were asked to identify items that were not stated clearly and to comment on the representativeness of each item and the comprehensiveness of the total instrument [46]. Panel feedback was incorporated and concurrence achieved that the items were appropriate and relevant for persons with a chronic illness who were experiencing fatigue and that the instrument operationalized the conceptual definition of PSEFSM.

Methods

Design

Secondary data analysis was used to establish further psychometrics for the PSEFSM Instrument. Since fatigue is a prevailing symptom during cancer and cancer treatment, the PSEFSM was incorporated into two studies to demonstrate reliability, construct validity, and generalizability. The two studies in which the PSEFSM Instrument was incorporated were National Cancer Institute-sponsored randomized control trials (RCTs): Barbara A. Given, 1998–2007, “The Family Home Care for Cancer: A Community-Based Model for Symptom Management (FHCC),” R01 CA-079280, and Charles W. Given, 2003–2007, “The Automated Telephone Monitoring for Symptom Management (ATSM),” R01 CA-30724. This secondary analysis employed a descriptive design using data from the RCTs’ baseline measures collected prior to any intervention.

Sample

The sample derived from the NIH studies was collected from seven different collaborating cancer sites throughout the United States. Study participants were at least 21 years old and undergoing a course of chemotherapy with at least two cycles remaining at the time of enrollment for a new or recurrent diagnosis of breast, colorectal, or lung cancer, other solid tumors and non-Hodgkin’s lymphoma, and may have been receiving concurrent radiation therapy. Persons had to be cognitively intact, English speaking, able to conduct telephone interviews, and not receiving hospice care. Specific inclusion criteria for the first RCT included reaching a symptom severity threshold of 2 out of 10 (10 = most severe) for both pain and fatigue or 3 out of 10 for either pain or fatigue. Specific inclusion criteria for the

second RCT required a symptom severity threshold of 2 out of 10 for at least 1 of 16 possible symptoms related to cancer and its treatment. Institutional Review Board approval was achieved for the protection of human subjects for the secondary analysis.

Thus, the sample ($N = 298$) included persons with breast ($n = 105$), lung ($n = 63$), colon ($n = 44$), and other sites of cancer diagnoses ($n = 86$). Table 1 describes the 298 participants in this study, which included 209 women and 89 men with a mean age of 57 years ($SD = 11.8$). Eighty-seven percent of participants were Caucasian, 10% were African American, and 3% were from other minority groups. Most participants were married (69%), had some college or technical education, and had an annual combined income of \$50,000 to \$74,999. Of the 298 persons with cancer, 21% were diagnosed with LC and 79% with OC diagnoses. The majority of participants had late-stage cancer (74%). The median number of co-morbid conditions per participant was two with hypertension (45%) and emotional problems (28%) accounting for most of the co-morbid conditions.

Other Measures

Demographic Data—Information was provided on sex, age, race, marital status, level of education, income, stage of cancer and co-morbid conditions. Stage of cancer was classified according to the tumor-node-metastasis staging system of the American Joint Committee on Cancer. For small cell lung cancer, a two-staged system was used: limited or extensive. For comparisons between those with limited disease and those with advanced disease, stages 0-II and limited stage were defined as early stage, and stages III-IV and extensive stage were defined as late stage. Co-morbid conditions were assessed using a modified version of the Comorbidity Questionnaire [47], which inquires about the presence of 15 chronic health conditions and has established content validity and test-retest reliability. For this study this variable consisted of a sum of the total number of health problems. In addition, the following paragraphs describe the measures used for fatigue, other symptoms, and PFS in this study.

Fatigue—The Brief Fatigue Inventory (BFI) is a 9-item measure that focuses on the assessment of fatigue severity. Substantial evidence supports the psychometrics of the BFI in the cancer population [48]. For this study, two items from the BFI (patient's current and worst severity of fatigue within the past seven days) were used to calculate a fatigue severity score (0–10, 10 most severe). The fatigue severity score was calculated by summing each subject's response for both fatigue severity items and dividing by two for a composite score on an 11-point scale. Current and worst fatigue severity were used since these observations were identically distributed as indicated by the high degree of correlation between these two items by a Cronbach's alpha of 0.85.

Other Symptoms—The Symptom Experience Inventory is a self-report measure of 16 symptoms related to cancer and its treatment [49]. On an 11-point scale (0–10, 10 most severe), patients were asked to rate the current severity of each of the symptoms. For this study, evaluation of internal consistency reliability resulted in a Cronbach's α of 0.72. The average symptom severity was calculated by summing each subject's severity scores for each symptom reported and dividing by the number of symptoms reported for a composite score on an 11-point scale. The average "other symptoms" severity score did not include the symptom of fatigue.

Physical Functional Status—The outcome, PFS, was measured using the 10-item physical functioning subscale of the Medical Outcomes Study 36-Item Short Form Health Survey [50]. The items capture the extent of PFS using a 3-point Likert-type scale, summed, and then transformed to a 0–100 scale, with higher scores indicating greater PFS. This

measure has been used extensively in populations with chronic illness and has provided evidence of psychometric soundness. In this study, the internal consistency reliability value is a Cronbach's α of 0.91.

Data Analysis

A form of EM (Expectation-Maximization; this algorithm finds the maximum likelihood estimates of parameters) [51, 52] was used for missing value analysis and imputation using SYSTAT Version 11.0 statistical software package (SYSTAT, Point Richmond, CA). Statistical data were analyzed with SPSS version 13.0 (SPSS Inc., Chicago IL). For this study, most items had complete data or a minimal rate of missingness ($< 0.005\%$ missing values). All missing data were deemed missing completely at random via Little's Missing Completely at Random test statistic.

Reliability was evaluated using a Cronbach's alpha to assess internal consistency. For this study, evidence of internal consistency of the PSEFSM Instrument was based on an alpha coefficient greater than or equal to .70 [53]. Cronbach's alphas of the main study variables are presented in Table 2.

Construct validity is the evidential basis for score interpretation with the score meaning strengthened if the degree of fit with the information pertaining to the theoretical rationale underlying score interpretation is explicitly evaluated [54]. The construct validation process was guided by Bandura's Self-Efficacy Theory that provides insight into how a person's PSE in his or her ability to self-manage fatigue influences performances of those behaviors. Bandura's Self-Efficacy Theory specifies how PSEFSM relates to fatigue severity and PFS by serving as a mediator between fatigue severity and PFS. Construct validity of the PSEFSM Instrument was tested using mediation modeling as specified by Baron and Kenny [55].

Coinciding with Bandura, Baron and Kenny [55] and Kenny [56] propose that mediators represent internal properties of a person that transforms the predictor variable, that goes beyond the explanatory information on why or how outcomes occur. Likewise, Bandura calls for the need to measure causal attributes such as PSEFSM rather than simply presuming the mediating link in order to isolate the important effects leading to optimal human functioning and validating theory. Recommendations have been made for the application of multivariate approaches such as mediation modeling to improve understanding of the complex nature of the symptom experience [57, 58]. Hierarchical multiple regression analyses were conducted to test the mediating effect of PSEFSM on the relationship between fatigue severity and PFS. Perceived self-efficacy for fatigue self-management would serve as a mediator if PSEFSM accounted for all or part of the relationship between fatigue severity and PFS. Baron and Kenny's [55] regression analyses procedure was followed. To test the mediation model, a series of three regression analyses were estimated:

1. $Y (\text{PSEFSM}) = b_0 + b_1 (\text{Fatigue severity})$
2. $Y (\text{PFS}) = b_0 + b_1 (\text{Fatigue severity})$
3. $Y (\text{PFS}) = b_0 + b_1 (\text{Fatigue severity}) + b_2 (\text{PSEFSM})$.

Partial mediation was established when the following conditions were met: 1) Fatigue severity affects PSEFSM in the first equation; 2) Fatigue severity affects PFS in the second equation; 3) PSEFSM affects PFS in the third equation; and, 4) when these conditions all hold in the predicted direction, and the effects of Fatigue severity on PFS is less in the third equation than in the second. Further analysis was performed which involved significance testing of the mediation pathway via the Sobel Test [55, 57]. Multigroup testing via

mediation modeling was performed to compare the performance of the PSEFSM Scale in the total sample and in persons with lung cancer (LC) and other cancer (OC) diagnoses.

Construct validity of the PSEFSM Instrument was assessed further using structural modeling with LISREL (Scientific Software International, Inc. Lincolnwood, IL) Version 8.72 statistical software package. The factorial structure of the model was estimated with six items specified to predict one factor, PSEFSM. The fit of the hypothesized model was tested using maximum likelihood estimation. Several fit indices were used to evaluate the model fit. A well-fitting model is one where the resulting chi-square value is small and not significant. The root mean square error of approximation (RMSEA) takes into account model complexity as reflected in the degrees of freedom. An RMSEA value below .05 indicates a good model fit with a value of 0 indicating exact fit.

Generalizability of construct validity concerns the extent to which score properties and interpretations generalize to and across other population groups, situations and settings, time, and tasks [59]. The degree of generalizability of construct meaning across contexts may be appraised by assessing the extent to which scores reflect comparable patterns of relationships with other measures and common underlying processes such as PSEFSM and the symptom experience [59]. This study employed a cross-sectional design with the measurement of data within this design bounded by the inclusion of all persons diagnosed with the disease of cancer undergoing chemotherapy with at least two cycles remaining at the time of enrollment. Moreover, the design included persons with LC and OC diagnoses, which gave a comparative basis to generalize the findings of the study to situations occurring within two population groups. Persons with LC were a focus relative to persons with OC diagnoses since persons with LC have more symptoms than other patients with solid tumors who are newly diagnosed and at the end-of-life [60, 61].

Results

Reliability

Internal consistency reliability was supported for the six-item PSEFSM Instrument with a Cronbach's coefficient alpha of .92 for the total sample, .91 for persons with LC, and .92 for persons with OC diagnoses that met the benchmarked criteria of a Cronbach's coefficient alpha value of 0.70 [53].

Construct Validity

Results of mediation modeling provided supporting evidence that the relationships among fatigue severity, PSEFSM, and PFS were consistent as hypothesized by Bandura's Self-Efficacy Theory. The results of mediation modeling for the total sample and by groups (LC and OC diagnoses) are provided in Table 3. For persons with cancer ($N = 298$), results indicated that PSEFSM partially mediated the relationship between fatigue severity and PFS. Significant paths were demonstrated from fatigue severity to PSEFSM ($b = -.40$; $p < .001$), from fatigue severity to PFS ($b = -6.06$; $p < .001$), from PSEFSM to PFS while controlling for fatigue severity ($b = 1.81$; $p = .006$), and from fatigue severity to PFS while controlling for PSEFSM ($b = -5.34$; $p < .001$). Note that the previously direct relationship between fatigue severity and PFS was reduced after PSEFSM was controlled. Results of the Sobel Test indicated that this indirect effect was significant ($t = -2.59$; $p = .009$). The results support a partial mediation model accounting for 12% of the total mediated effect.

The findings from structural modeling provided further evidence of construct validity of the PSEFSM Instrument. The results of the hypothesized model indicated a good model fit with six observed variables predicting one latent variable, PSEFSM, and the latent variable PSEFSM indicated by itself which explained 80% of the outcome variable. As presented in

the Figure, all the paths in the model were supported by data ($t > \pm 2.0$). The results of the analysis indicated a good model fit: ($X^2 = 0.00$; $p = 1.0$; $df = 15$; RMSEA = 0.00).

Generalizability—As previously indicated, the results of mediation modeling demonstrate that for the total sample, fatigue severity directly influences PFS and indirectly influences PFS through its effect on PSEFSM. Moreover, similar to the total sample, the results from mediation modeling by group analyses for persons with LC and OC diagnoses indicated that PSEFSM partially mediated the relationship between fatigue severity and PFS. As shown in Table 3, by group analyses for persons with LC and OC diagnoses, there were statistically significant relationships between fatigue severity and PSEFSM, fatigue severity and PFS, PSEFSM and PFS while controlling for fatigue severity, and fatigue severity and PFS while controlling for PSEFSM. The previously direct relationship between fatigue severity and PFS for persons with LC and OC was reduced after PSEFSM was controlled demonstrating partial mediation. The results of the Sobel Test for the OC diagnosis group indicated that this indirect effect was significant ($t = -2.32$; $p = .02$) supporting a partial mediation model accounting for 12% of the total mediated effect. In order to maximize the power to detect Type I errors, Hoyle and Kenny [62] recommend having a minimum of at least 200 cases to perform the Sobel Test. Thus, the Sobel Test was not performed with the LC group ($n = 63$). Generalizability across cancer populations makes it clear focusing on PSE is an important factor in optimizing the management of fatigue for greater PFS.

Discussion

The purpose of this study was to describe the development and testing of a measure for PSEFSM. Evidence to support the PSEFSM Instrument was obtained through an expert panel for content validity, and analyses was conducted showing appropriate reliability, construct validity, and generalizability. Internal consistency reliabilities were well above the desired criterion of .70 for the total sample and persons with LC and OC diagnoses ($r \geq .91$). Moreover, a sound theoretical foundation, Bandura's Self-Efficacy Theory, was used alongside an explanatory statistical approach, Baron and Kenny's mediation modeling. The PSEFSM Instrument earned credibility since the empirical response reflected the theoretical meaning of the construct PSEFSM derived from Self-Efficacy Theory for the total sample and by group, persons with LC and OC diagnoses. Bandura [27] identified PSE as a powerful mediator linked to successful outcome attainment. In this study, for the total sample and in the LC and OC groups separately, the hypothesis of mediation was supported. Greater fatigue severity in the context of lower PSEFSM was related to lower PFS. The model also demonstrated a partial mediation that indicates that the severity of fatigue directly influences PFS and indirectly influences PFS by its effect on PSEFSM. Examining the factorial structure of the PSEFSM Instrument by testing the hypothesized relationships using Self-Efficacy Theory further supported construct validity. Thus, PSEFSM is an important factor in optimizing the self-management of fatigue for greater PFS across cancer diagnoses. Moreover, similar fatigue experiences were found across cancer diagnoses that contributed to consistent PSEFSM performance.

Implications for Research and Practice

To date, scientists theorize about the root causes of fatigue and further research is urgently needed to develop effective fatigue self-management interventions to improve outcomes such as PFS. This study provides a validated measure of PSE centered on a symptom, fatigue that is reported by patients to be the most frequently occurring, persistent and severe symptom that directly impacts PFS. Lev et al. [39] suggest that the use of psychosocial factors in the form of efficacy enhancing interventions may reduce the perception of stress and reported symptoms and increase a positive perception of quality of life. This study

provides construct validity evidence to measure PSEFSM not only in the general cancer population but also in persons with LC and OC diagnoses.

Findings of this study show beginning evidence for the generalizability of the PSEFSM construct across chronic illness populations. Correlations derived from mediation modeling across LC and OC diagnoses indicated that the meaning of measurement scores for the construct of PSEFSM was the same for both population groups. Similarly, while analyses demonstrated the beneficial effect that PSEFSM has on PFS, the study also demonstrated that there are similarly shared symptom experiences among persons with LC and OC diagnoses. The fatigue experience in persons with LC and OC diagnoses encompasses multi-symptom relationships. Of particular interest is the significant positive association between fatigue severity and the average severity of the other unpleasant symptoms. The authors' identified fatigue as a priority symptom found to influence increased average severity of other unpleasant symptoms leading to lower PFS. In this study, out of the 15 symptoms comprising a component of the average symptom severity level, weakness, dyspnea, dry mouth, nausea, and lack of appetite were severe and individually positively correlated with fatigue severity in both persons with LC and OC diagnoses. Evidence also exists in the literature demonstrating a variety of relationships between and among these five symptoms relative to fatigue within the cancer population, which requires further exploration [63–66]. There exists a great need for a clearer understanding of multi-symptom relationships with a focus on a particular symptom such as fatigue that may make all the other symptoms worse and negatively affect PFS.

The PSEFSM Instrument is useful since it measures a specific situation, PSEFSM. Fatigue has been identified as a complex problem in chronic illness populations such as cancer that is severe and interferes with usual functioning. To ensure accurate measurement of PSE, Bandura [27] informs researchers and clinicians to ensure that scales measuring PSE are specific to the situation being measured and to the population of the study. Thus, the PSEFSM Instrument concentrates on the measurement of PSEFSM for the chronic illness population. The PSEFSM Instrument is brief and easy to complete which results in a low response burden from persons who are already fatigued providing for regular use in research and practice settings.

Strengths and Limitations

This instrument is specific to fatigue self-management but only tested in the cancer population and needs to be tested in other chronic illness populations where fatigue is a strong component. This was a secondary analysis, using data from two RCTs, both of which only included persons with cancer undergoing chemotherapy with at least two cycles remaining at the time of enrollment; one also required the presence of either high pain or fatigue, whereas the other required the presence of one symptom. The sample was nearly all Caucasian. Data used in the analyses is from a nonprobability sample selection procedure. Thus, the findings of the analyses can be generalized only to patients with cancer undergoing chemotherapy and having fatigue or other symptoms, not the general cancer population. Another limitation of the analyses is the cross-sectional design, which precludes determination of temporal effects among the variables examined. However, the measurement within this design was bounded by all persons diagnosed with cancer undergoing chemotherapy with at least two cycles remaining at the time of enrollment. Future assessment of the stability of the PSEFSM Instrument over time is recommended through test-retest reliability. Strength given to the PSEFSM Instrument is that the PSEFSM Instrument was developed through an extensive review of the literature using key words and thesaurus terms via PubMed, MEDLINE, CINAHL, and PsycINFO (fatigue, symptoms, self-efficacy, self-management, chronic disease, chronic illness, Parkinson's disease, multiple sclerosis, chronic heart failure, cardiac, chronic obstructive pulmonary disease,

renal disease, human immunodeficiency virus, diabetes, and cancer); an evaluation by a panel of 13 content experts who represented the intended population for use of this instrument; and hypothesis testing within the population for intended use of the PSEFSM Instrument using mediation modeling guided by Bandura's Self-Efficacy Theory.

Conclusion

Fatigue is a prevalent symptom in persons with chronic illness. Self-management of this distressing symptom depends on a person's PSE. This study presents a validated instrument to measure PSEFSM that is an important first step to enhance PSEFSM.

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Figure.

Perceived Self-Efficacy for Fatigue Self-Management Model

- ❖ Solid line means a significant direct path ($t > \pm 2$).
- ❖ Dashed line indicates measurement error.
- ❖ The numerical values represent standardized path coefficients.
- ❖ Rectangle means observed variable. Oval means latent variable.
- ❖ $\chi^2 = 0.00$; $p = 1.0$; $df = 15$; Root Mean Square Error of Approximation = 0.00.

Table 1Patient Characteristics ($N = 298$)

Characteristics	<i>n</i>	%
Gender		
Men	89	30
Women	209	70
Race		
Caucasian	259	87
Other	39	13
Marital Status		
Married	205	69
Not married	93	31
Education Completed		
Less than high school	30	10
High school	73	24
Some college/Technical training	86	30
College	60	20
Graduate/Professional	49	16
Annual Household Income		
< \$24,999	43	15
\$25,000–\$49,999	77	26
\$50,000–\$74,999	84	28
\$75,000–\$99,999	34	11
> \$100,000	60	20
Stage of cancer		
Early	78	26
Late	220	74

Table 2

Descriptive Statistics for the Main Study Variables

Measure	<i>n</i>	<i>M (SD)</i>	Skewness (Kurtosis)	Potential Range	Internal Consistency Cronbach's alpha
Fatigue Severity	298	5.84 (2.23)	-0.759 (-2.90)	0-10	.85
Average Symptom Severity	296	4.64 (1.58)	0.387 (1.11)	0-10	.72
Perceived Self-Efficacy for Fatigue Self-Management	298	6.43 (2.25)	-1.33 (-2.87)	0-10	.92
Physical Functional Status	298	58.10 (27.10)	-1.94 (-3.63)	0-100	.91

Table 3

Regression Coefficients for Mediation Modeling

Group	Fatigue to PSEFSM			Fatigue to PFS			PSEFSM to PFS Controlling for Fatigue			Fatigue to PFS Controlling for PSEFSM		
	<i>b</i>	<i>SE</i>	<i>B</i>	<i>p</i>	<i>b</i>	<i>SE</i>	<i>B</i>	<i>p</i>	<i>b</i>	<i>SE</i>	<i>B</i>	<i>p</i>
Total Sample (<i>n</i> = 298)	-.40	.05	-.39	<.001	-6.06	.62	-.50	<.001	1.81	.66	.15	.006
Other Cancer (<i>n</i> = 235)	-.43	.06	-.42	<.001	-5.93	.64	-.52	<.001	1.68	.69	.15	.01
Lung Cancer (<i>n</i> = 63)	-.26	.12	-.27	.03	-6.60	1.49	-.49	<.001	3.70	1.52	.272	.017

Notes:

Fatigue = Fatigue Severity; PSEFSM = Perceived Self-Efficacy for Fatigue Self-Management; PFS = Physical Functional Status; *b* = Unstandardized Regression Coefficient; *B* = Standardized Regression Coefficient.

Sobel Test for the Total Sample: Partial mediation model accounting for 12% of the total mediated effect ($t = -2.59$; $p = .009$).

Sobel Test for the Other Cancer Diagnoses Group: Partial mediation model accounting for 12% of the total mediated effect ($t = -2.32$; $p = .02$).