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Measurement of Fatigue in Cancer, Stroke, and HIV Using the Functional Assessment of Chronic Illness Therapy – Fatigue (FACIT-F) Scale

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Abstract

Objective—Given the importance of fatigue in cancer, stroke and HIV, we sought to assess the measurement properties of a single, well-described fatigue scale in these populations. We hypothesized that the psychometric properties of the Functional Assessment of Chronic Illness Therapy – Fatigue (FACIT-F) subscale would be favorable and that the scale could serve as a useful indicator of fatigue in these populations.

Methods—Patients were eligible for the study if they were outpatients, aged 18 or older, with a diagnosis of cancer (n=297), stroke (n=51), or HIV/AIDS (n=51). All participants were able to understand and speak English. Patients answered study-related questions, including the FACIT-F using a touch-screen laptop, assisted by the research assistant as necessary. Clinical information was abstracted from patients' medical records.

Results—Item-level statistics on the FACIT-F were similar across the groups and internal consistency reliability was uniformly high (α>0.91). Correlations with performance status ratings were statistically significant across the groups (range r=−0.28 to −0.80). Fatigue scores were moderately to highly correlated with general quality of life (range r=0.66–0.80) in patients with cancer, stroke, and HIV. Divergent validity was supported in low correlations with variables not expected to correlate with fatigue.

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Competing Interest Statement
The authors have no competing interests to report.

Conclusions—Originally developed to assess cancer-related fatigue, the FACIT-F has utility as a measure of fatigue in other populations, such as stroke and HIV. Ongoing research will soon allow for comparison of FACIT-F scores to those obtained using the fatigue measures from the Patient-Reported Outcomes Measurement Information System (PROMIS®; www.nihpromis.org) initiative.

Keywords

fatigue; assessment; psychometrics; cancer; stroke; HIV

Fatigue is the most prevalent symptom among individuals with cancer and may be due to the disease itself, its treatment, and/or psychosocial variables.[1] Depending on the patient population and means of measuring fatigue, prevalence estimates among cancer patients are generally high, ranging from 60 to over 90%.[1] Patients may describe their experience of fatigue in terms of being exhausted, tired, weak, or slowed. Furthermore, in a large sample of patients with advanced cancer who have received chemotherapy, fatigue was spontaneously endorsed and ranked as the most important symptom that should be monitored.[2] Although common, cancer-related fatigue remains poorly understood.[3] In clinical practice, fatigue may be neglected or under-detected due to the fact that it is a subjective experience that is assessed by patient self-report. Treatment of cancer-related fatigue is further complicated by its multifactorial clinical manifestations, involving both psychological and physical components.

Stroke is the leading cause of disability in adults and often results in reduced functional status, impaired psychological well-being, and economic hardship.[4] Persistent fatigue is a common symptom following stroke, [5] with prevalence estimates ranging from 23 to 75%, likely reflecting variations in measurement and sampling approaches. [5,6] The frequency of self-reported fatigue is roughly twice as high in patients post stroke as it is in matched controls, and 27% of stroke survivors experience fatigue every day.[7] Little research has focused on how best to measure post-stroke fatigue quantitatively.

People with HIV infection have reported fatigue as one of their most frequent complaints, regardless of how advanced their HIV infection or their use of Highly Active Antiretroviral Therapy.[8] For example, a study of 317 men and women who had been diagnosed with HIV for several years found that the three most frequently reported symptoms, using the Memorial Symptom Assessment Scale, were all fatigue-related: “lack of energy” (65%); “feeling drowsy” (57%); and “difficulty sleeping” (56%).[9] Furthermore, fatigue has been shown to affect the physical, social, familial, and psychological aspects of the lives of individuals with HIV. [10] Women and older persons with HIV infection have reported more fatigue than men and younger persons with HIV.[11] Despite the prevalence and impact of fatigue in the lives of people with HIV, family and physicians often do not acknowledge fatigue as a significant concern.[12]

Fatigue may develop for different reasons in cancer, stroke, and HIV. However, given the importance of fatigue across these three chronic conditions, we sought to assess the measurement properties of a single, well-described fatigue scale in these populations. We hypothesized that the psychometric of the Functional Assessment of Chronic Illness Therapy – Fatigue subscale[13] would be favorable and that the scale could serve as a useful indicator of fatigue in clinical research across these populations.

Method

Assessment of fatigue

All participants completed the Functional Assessment of Chronic Illness Therapy – Fatigue (FACIT-F) subscale.[13] The FACIT-F is a unidimensional,[14] 13-item scale that asks respondents to rate statements regarding their fatigue experience and its impact on their daily life. Sample items include: “I feel fatigued;” “I feel weak all over;” and “I feel listless (washed out)”. All items are rated using a 5-point intensity rating scale. By scoring convention, after appropriate reverse scoring of 11 items, lower scores on the FACIT Fatigue subscale indicate greater levels of fatigue. (A scoring template is available at www.facit.org.) Originally developed for use with cancer patients,[15,16] the scale has been successfully administered in a variety of other populations, including rheumatoid arthritis,[17,18] Parkinson’s disease,[19] systemic lupus erythematosis,[20] chronic anemia associated with aging,[21] as well as the general United States population.[3] To enhance the clinical usefulness of the FACIT-F subscale, Cella and colleagues[16] estimated a minimum clinically meaningful difference of 3 points by using both anchor- and distribution-based methods. Additionally, Eastern Cooperative Oncology Group (ECOG) performance ratings were available for all cancer patients and hemoglobin values, obtained within 30 days of fatigue ratings, were available for a subset of 430 cancer patients.

Patient Eligibility and Recruitment

Patients were eligible for the study if they were outpatients, aged 18 or older, with a diagnosis of cancer, stroke, or HIV/AIDS. All recruited patients were able to understand and speak English and could interact with a touch-screen computer with minimal assistance. While there were no general restrictions regarding disease severity or treatment status; stroke patients were required to score higher than 23 on the Folstein Mini-Mental Status Exam.[22]

Cancer patients were recruited from the Robert H. Lurie Comprehensive Cancer Center of Northwestern University. Additional details on the cancer population can be found in Lai et al.[23] Patients with HIV/AIDS were recruited from Northwestern Memorial Hospital in Chicago and stroke patients were recruited from the Rehabilitation Institute of Chicago.

Patients were approached for participation at the respective recruitment sites by trained research assistants and were also informed that they would be asked questions about their fatigue and degree of tiredness. All patients answered study-related questions using a touch-screen laptop, assisted by the research assistant as necessary. Clinical information was abstracted from patients’ medical records. Study procedures were approved by the institutional review boards of the respective recruitment sites and all patients provided informed consent.

Results

Sociodemographic and clinical descriptions of the samples can be found in the Appendix. Patients with cancer, stroke, and HIV were all middle-aged or older. There was variability in the gender distribution within the samples, with HIV patients more likely to be male. Most participants were Caucasian (50–82.5%), with the second largest group being African-Americans (9.4–43.1%).

Most cancer patients had breast (34%) or colorectal (12.5%) cancer, with nearly equal numbers of patients with stage III or IV disease as those with less advanced cancers. Most participants with stroke sustained an infarct (70%) that was subcortical (56.8%) in location. Over a quarter (27.5%) of the stroke sample had experienced a previous stroke. Most

patients with HIV had a CD4 exact count of 456, with a viral load that was either undetectable (43.1%) or < 5000 mL (31.4%).

Table 1 shows that that item-level statistics for the FACIT-Fatigue are similar across the three patient samples. The FACIT-Fatigue subscales scores (means ± SDs) for the three sample groups were similar, on average, with higher scores indicating lower levels of fatigue: cancer 36.0 ± 12.1, stroke 38.1 ± 9.6; HIV 34.0 ± 12.6. These three means were also worse than the FACIT-F score (=43) suggested to distinguish between the US general population and anemic cancer patients.[3] The internal consistency reliabilities were also similar across the groups with Cronbach alphas > 0.91.

As seen in Table 2, FACIT-Fatigue scores were significantly correlated with patient-rated ECOG performance status rating for all three samples — cancer ($r = -0.55$, $p = 0.001$), stroke ($r = -0.28$, $p = .04$), and HIV ($r = -0.80$, $p < 0.001$). Similarly, fatigue scores were highly associated with overall quality of life, as measured by the FACT-General and its subscales, across all three samples — cancer ($r = 0.78$, $p < 0.001$), stroke ($r = 0.66$, $p < 0.001$), and HIV ($r = 0.80$, $p < 0.001$). Although FACIT-Fatigue scores were correlated with patient performance status and self-reported well-being, the association of fatigue scores with clinical factors not usually correlated with fatigue (cancer stage, $r = 0.02$; Mini-Mental State Examination scores in stroke, $r = 0.17$; viral load in HIV, $r = 0.07$; were small and not statistically significant ($p > 0.05$).

Table 3 describes the association between patient fatigue and performance status, as a function of diagnosis. The performance status scores of cancer, stroke and HIV groups ($n = 399$) were compared along the four response options: “0 [PS value], normal activities without symptoms” ($n = 121$), “1, some symptoms, but do not require bed rest during the day” ($n = 183$), “2, require bed rest for less than 50% of waking day” and “3, require bed rest for more than 50% of waking day” ($n = 95$). To account for low cell size in the more severe PS categories, we combined performance status ratings of 2 and 3 into a single category.

As expected, there was a main effect for performance status, with fatigue worsening with greater needs for bed rest ($F[2, 398] = 60.9$, $p < 0.001$). We also found a main effect for diagnosis ($F[2, 398] = 4.56$, $p < 0.05$), which should be interpreted with caution, given the differential distribution of performance status ratings across the patient groups. A test for a diagnosis-ECOG interaction revealed a marginally significant interaction ($F[4, 398] = 3.15$, $p = 0.05$). As predicted, the patient groups reported similar levels of fatigue at the performance status ratings 0 and 1 ($p > 0.05$). However, at the more severe ECOG PS, we found that patients with stroke experienced significantly less fatigue (33.9 ± 9.1) than those diagnosed with cancer (22.9 ± 11.2) or HIV (19.5 ± 8.7), $p < 0.01$.

Figure 1 depicts FACIT-Fatigue scores as a function of performance status ratings across the three patient groups: Fatigue worsens as performance status worsens. The trend is remarkably consistent for the cancer and HIV populations. For patients with stroke, those in the worst performance status category did not report as much fatigue as those with cancer or HIV.

Discussion

Fatigue is a common concern for patients with a variety of chronic illnesses. Having a common metric that can be used across clinical studies has the potential advantage of increasing comparability across studies, while improving our understanding of mechanisms and potential interventions for this symptom. As an initial step towards that goal, we tested the reliability and validity of fatigue, as measured by the FACIT-Fatigue scale in samples of

patients with cancer, HIV, and stroke. Our results were promising and suggest that the scale may have utility for assessment of fatigue in populations outside of cancer (for which the scale was originally developed).

While this study did not ensure that the items of the FACIT-F capture every aspect of fatigue experienced by patients with HIV and stroke, it does provide reassurance that the set of FACIT-F questions are perceived as relevant and responsive to fatigue caused by a variety of conditions. The purpose of this article was not to extend or even claim content validity in stroke and HIV patients, but to evaluate the performance of this well-tested instrument in two new clinical populations. In that regard, key aspects of reliability and validity were demonstrated. Internal consistency reliabilities for the FACIT-F were uniformly high across the samples. Fatigue was correlated with general quality of life and performance status ratings, in expected ways. Evidence for divergent validity of the FACIT-F was similar across the samples – fatigue was not associated with sex, ethnicity, age, or specific clinical indicators. Fatigue ratings were lowest for stroke survivors; additionally, fatigue does not seem to characterize the most disabled stroke survivors to the extent that it does for patients with cancer or HIV. Unlike in cancer or HIV, both systemic diseases, worse performance status in stroke may reflect physical disability more than fatigue or low energy. This hypothesis has recently been supported in the stroke literature, albeit in relatively small samples.[24–26]

While the cancer sample was relatively large, this study included a limited number of patients with stroke or HIV. Readers should be cautious in generalizing conclusions based on association of clinical variables with fatigue; however, it is unlikely that a larger sample of patients would result in significant changes in the reliability of the scales or their validity in terms of general quality of life or performance status.

In summary, the FACIT-F is a brief, easy to administer, patient-reported instrument to assess fatigue. Originally developed to assess cancer-related fatigue, the scale has utility as a measure of fatigue across a number of chronic conditions. There are other instruments to choose from to measure fatigue in HIV and stroke. The value of demonstrating the validity of the FACIT-F in these patient groups is the ability to compare fatigue across groups without having to switch from one disease-specific instrument to another. This approach capitalizes on the common rather than unique elements of fatigue in these populations (to the extent there is a unique ground), and more readily allows for cross-disease comparisons of symptom reporting, for example.

Additional study of the scale's psychometric properties in stroke and HIV may help improve our understanding of symptom onset, trajectory, and treatment. Ongoing research will soon allow for comparison of FACIT-Fatigue scores to those obtained using the fatigue measures from the Patient-Reported Outcomes Measurement Information System (PROMIS®; www.nihpromis.org) initiative.[27] The aim of this multi-center, collaborative project is to improve and standardize the measurement of clinically relevant symptoms, such as fatigue. PROMIS fatigue measures offer flexibility to researchers to measure over a broad spectrum of fatigue using dynamic computerized adaptive testing (CAT). FACIT-F items contributed to the PROMIS item banks;[28] creation of a linkage or look-up table to convert FACIT and PROMIS scores would allow for more direct comparison of completed and future studies that use these instruments.[29]

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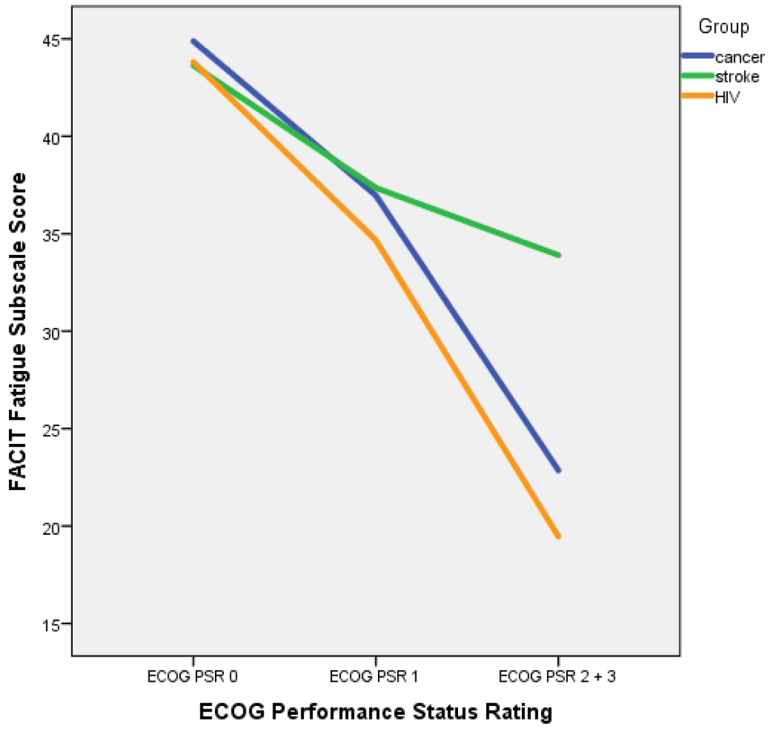

Figure 1. Fatigue as a function of performance status rating

By convention, lower scores on the FACIT-Fatigue indicate more fatigue.

Table 1

FACIT-Fatigue subscale properties across chronic illness populations

	CANCER (n = 297)				STROKE (n = 51)				HIV (n = 51)				
	Subscale M (SD) = 36.0 (12.1)				Subscale M (SD) = 38.1 (9.6)				Subscale M (SD) = 34.0 (12.6)				
	Chronbach α = 0.96				Chronbach α = 0.91				Chronbach α = 0.97				
Item	**M**	**SD**	**Item-total correlation**	**α if item deleted**	**M**	**SD**	**Item-total correlation**	**α if item deleted**	**M**	**SD**	**Item-total correlation**	**α if item deleted**	**Item**
HI7	2.46	1.18	0.84	0.95	2.78	1.08	0.64	0.90	2.14	1.10	0.86	0.96	HI7
HI12	2.98	1.20	0.84	0.95	3.28	1.01	0.78	0.90	2.80	1.15	0.83	0.96	HI12
AN1	2.80	1.21	0.85	0.95	3.06	1.18	0.74	0.90	2.80	1.11	0.83	0.96	AN1
AN2	2.53	1.15	0.87	0.95	2.76	1.08	0.84	0.89	2.29	1.12	0.82	0.96	AN2
AN3	2.82	1.18	0.83	0.95	3.02	1.12	0.85	0.89	2.55	1.15	0.85	0.96	AN3
AN4	2.76	1.18	0.83	0.95	2.96	1.12	0.85	0.89	2.53	1.21	0.90	0.96	AN4
AN5	2.18	1.12	0.74	0.95	2.10	1.03	0.60	0.90	2.18	1.01	0.81	0.96	AN5
AN7	2.38	1.21	0.69	0.96	2.06	1.27	0.49	0.91	2.55	1.10	0.71	0.97	AN7
AN8	2.89	1.06	0.62	0.96	2.96	1.23	0.15	0.92	2.63	1.25	0.81	0.96	AN8
AN12	3.58	0.76	0.62	0.96	3.72	0.67	0.46	0.91	3.33	0.91	0.70	0.97	AN12
AN14	3.20	1.07	0.68	0.96	3.04	1.03	0.38	0.91	3.12	1.03	0.81	0.96	AN14
AN15	2.73	1.27	0.84	0.95	3.26	0.94	0.75	0.90	2.57	1.38	0.90	0.96	AN15
AN16	2.72	1.28	0.82	0.95	3.12	1.06	0.77	0.90	2.47	1.21	0.86	0.96	AN16

Notes:

1. Item means, item-total correlations, and alpha are based on reverse-scoring rules for the FACIT-Fatigue subscale (http://www.facit.org).
2. All 13 items are rated on a 0 to 4 scale.
3. By convention, lower scores on the FACIT-Fatigue indicate more fatigue.

Table 2

Correlations of FACIT-Fatigue subscale scores with other clinical variables

	Cancer (n = 297)		Stroke (n = 51)		HIV (n = 51)	
	t (df) or correl	**p**	**t (df) or correl**	**p**	**t (df) or correl**	**p**
Sex	−0.87 (295)	0.23	−0.65 (49)	0.52	0.30 (49)	0.77
Ethnicity (Caucasian vs. Other)	0.45 (295)	0.66	−1.14 (49)	0.26	−1.04 (48)	0.30
Age	0.04	0.48	0.21	0.15	−0.02	0.87
Patient-rated ECOG performance status rating	−0.66	<0.001	−0.28	<0.04	−0.80	<0.001
General quality of life (FACT-G)	0.78	<0.001	0.66	<0.001	0.80	<0.001
FACT physical well-being (PWB)	0.82	<0.001	0.76	<0.001	0.88	<0.001
FACT social well-being (SWB)	0.31	<0.001	0.43	0.001	0.32	<0.03
FACT emotional well-being (EWB)	0.52	<0.001	0.47	<0.001	0.58	<0.001
FACT functional well-being (FWB)	0.73	<0.001	0.43	<0.001	0.75	<0.001
Stage of illness	0.02	0.74				
Extent of illness (exc. N/A)	−0.11	0.09				
MMSE			0.17	0.24		
Type of stroke (hemorrhagic vs. infarct)			−0.91 (48)	0.37		
CD4 exact count					0.07	0.61
Viral load					0.02	0.90

Notes:

1. As expected, FACIT-Fatigue subscale shows association with performance status and different aspects of well-being, but not clinical variables not generally associated with fatigue.

Table 3

FACIT Fatigue subscale scores by disease and ECOG Performance Status Rating

	Cancer (n = 297)		Stroke (n = 51)		HIV (n = 51)			
Patient-rated ECOG Performance Status	**n**	**M (SD)**	**n**	**M (SD)**	**n**	**M (SD)**	**p-value**	**planned contrasts**
0, normal activities without symptoms	89	44.9 (7.0)	11	43.6 (5.2)	21	43.8 (5.0)	0.70	C = S = H
1, some symptoms, but do not require bed rest during the waking day	138	37.0 (8.9)	30	37.3 (10.2)	15	34.7 (9.0)	0.62	C = S = H
2, require bed rest for less than 50% of waking day 3, require bed rest for more than 50% of waking day	70	22.9 (11.2)	10	33.9 (9.1)	15	19.5 (8.7)	< 0.01	S > C = H (S less fatigue)

Notes:

1. Main effect for diagnosis – $F(2, 398) = 4.56$, $p < 0.05$
2. Main effect for ECOG PS – $F(2, 398) = 60.9$, $p < 0.001$
3. Diag x ECOG interaction – $F(4, 398) = 3.15$, $p = 0.05$
4. By convention, lower scores on the FACIT-Fatigue indicate more fatigue.

Appendix

Sociodemographic and clinical description of samples

	Cancer (n = 297)	Stroke (n = 51)	HIV (n = 51)
Sociodemographic Information			
Female (%)	64.3	51.0	11.8
Age (M(SD) years)	58.1 (13.5)	62.6 (13.9)	40.2 (6.9)
Race (%)			
Caucasian	82.5	62.7	50.0
Hispanic	3.7	2.0	17.6
African-American	9.4	31.4	43.1
Asian	4.0	3.9	
Pacific Island	0.7		
Other	1.0	4.0	2.0
Marital Status (%)			
Never Married	12.5	17.6	68.6
Married	64.0	47.1	7.8
Living with Partner	1.7		17.6
Separated	1.0	5.9	2.0
Divorced	9.4	13.7	3.9
Widowed	11.4	15.7	
Living Situation (%)			
Alone	22.9	35.3	45.1
With other adult(s), no dependent	53.9	56.9	51.0
With other adult(s), and dependents	21.5	7.8	3.9
With dependents only	1.3		
Institution or Retirement Home	0.3		
Education (%)			
≤ High school diploma	18.2	27.5	25.5
Some college	28.6	29.4	29.4
College degree	31.0	29.4	35.3
Advanced degree	22.2	13.7	9.8
Occupational Status (%)			
Homemaker	6.8	7.8	2.0
Unemployed	2.4	5.9	3.9
Retired	33.1	51.0	
On disability	13.5	23.5	47.1
On leave of absence	4.7		
FT employed	28.4	7.8	47.1
PT employed	11.1	3.9	
Clinical Information			
Cancer Type (%)			
Breast	34.0		

	Cancer (n = 297)	Stroke (n = 51)	HIV (n = 51)
Colorectal	12.5		
Non-Hodgkins Lymphoma	8.5		
Ovarian	7.1		
Lung	6.5		
Prostate	5.1		
Cancer Stage (%)			
0	1.6		
1	12.8		
2	24.9		
3	23.3		
4	19.5		
Extent of Disease (%)			
NED	12.0		
Local	17.2		
Regional	4.0		
Metastasis	51.8		
N/A	15.0		
Mini-Mental Status Exam (%)*			
30		27.5	
29–28		43.1	
27–26		23.5	
25–24		5.9	
Type of Stroke			
% Infarct		70.0	
Subtype of Stroke (%)			
Intracerebral hemorrhage (ICH)		36.4	
Subarachnoic hemorrhage (SAH)		12.1	
Thrombotic		36.4	
Embolic		15.2	
Location (%)			
Superficial/cortical		27.3	
Subcortical		56.8	
Combination or Other		15.9	
% with Previous Stroke		27.5	
Current Stroke Treatment (%)			
Physical Therapy		51.0	
Speech Therapy		17.6	
Vocational Therapy		3.9	
Psychological Intervention		3.9	
Occupational Therapy		35.3	
CD4+ T cell Count			
Mean (SD)			456 (315)

	Cancer (n = 297)	Stroke (n = 51)	HIV (n = 51)
Minimum			6
Maximum			1248
HIV Viral Load (%)			
Undetectable			43.1
< 5000 mL			31.4
5000 – 49,000 mL			7.8
50,000 – 100,000 mL			7.8
> 100,000 mL			9.8