Published in final edited form as:
J Pain Symptom Manage. 2011 March ; 41(3): 549–557. doi:10.1016/j.jpainsymman.2010.05.013.

Psychometric Properties of a Symptom Management Self-Efficacy Scale for Women Living with HIV/AIDS

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Abstract

Context—Many people with HIV/AIDS find it difficult to manage the symptoms of the disease, but by adopting effective symptom management behavior, they increase the potential of alleviating the burden of those symptoms. Self-efficacy is a recognized mediator of successful behavior change and is utilized by many researchers and clinicians when developing symptom management interventions. Despite this, an instrument measuring the self-efficacy of symptom management behavior specifically for people living with HIV/AIDS has not yet been made available.

Objective—To introduce and test the psychometric properties of the HIV Symptom Management Self-Efficacy for Women Scale (HSM-SEWS) for women with HIV/AIDS. This scale, a new 9-item measurement instrument, was modified from the Chronic Disease Self-Efficacy Scale.

Methods—In this study, psychometric testing focused on the reliability and validity of the HSM-SEWS instrument. Reliability was assessed using Cronbach's alpha. Exploratory factor analysis with oblique promax rotation was used to examine validity and test hypothetical associations.

Results—Eighty-nine HIV-positive women were recruited and asked to complete the scale every four weeks for a total of 16 weeks. Factor analysis supported a one-factor solution explaining 93% of the variance among items. Internal consistency of the nine items was found to range from 0.83–0.93, with an overall Cronbach's alpha of 0.92.

Conclusions—Psychometric analyses suggest that the HIV Symptom Management Self-Efficacy for Women Scale is a reliable and valid instrument that measures the self-efficacy of symptom management behavior in women with HIV/AIDS and can be used during interventions and in research targeting this area of health care research.

Keywords

Self-efficacy; symptom management; psychometric; women; HIV/AIDS

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The authors declare no conflicts of interest.

Introduction

Symptom management behavior is a complex and dynamic process and enables people living with HIV/AIDS to live healthier lives (1–3). Many people with HIV/AIDS find it difficult to manage the symptoms of the disease, but by adopting effective symptom management behavior, they may increase the potential of alleviating the burden of those symptoms. The ability to detect symptom changes, knowledge of how to treat those changes, communication with one's health care provider, and adherence to the necessary treatments are behaviors that must be developed or enhanced after one's diagnosis of HIV. Although many interventions have already been developed to increase symptom management behavior, their degree of success varies (4–6).

Self-efficacy is an important factor in behavior change. Self-efficacy is defined as one's confidence in his or her ability to do a specific task or achieve a certain outcome (7). Its growing recognition as a mediator of successful behavior change has encouraged many researchers and clinicians to use it when developing interventions (8–11). Instruments to measure self-efficacy in condom use, HIV medication adherence, and disease management have been developed and validated (5,12–15). These valuable instruments have been used to describe and test the effect of interventions on self-efficacy of specific HIV behavior changes, and have helped clarify the process whereby these interventions modify one's internal concept of self-efficacy. Despite the significant benefits of these scales, a specific instrument to measure the self-efficacy of symptom management behavior in people living with HIV/AIDS has not yet been made available to researchers. In order to conduct rigorous research, it is critical that researchers are utilizing appropriate instruments to ensure that the research is measuring what it purports to measure. Therefore, the purpose of this paper is to introduce and discuss the psychometric properties of the HIV Symptom Management Self-Efficacy for Women Scale (HSM-SEWS) for women living with HIV/AIDS.

Literature Review: Self-Efficacy and HIV Instruments

Self-efficacy is a critical component of Bandura's Social Cognitive Theory of human behavior and has been found to be a mediator of several important behavioral relationships in those infected with HIV/AIDS (7). A literature review on self-efficacy and HIV instruments revealed three main areas in which the importance of self-efficacy in HIV management behavior was demonstrated: condom use, medication adherence, and disease management (16–18). Accordingly, researchers and clinicians have developed and tested the psychometric properties of these instruments.

Condom Use—Over the past 30 years, self-efficacy to use condoms has been assessed with several different instruments. Of these, one of the most commonly used instruments is Bradford and Beck's 1991 scale. The original scale contained 28 items in three factors and was patterned on a 0–4 Likert scale. Psychometric testing found that the instrument had a Cronbach's alpha of 0.91 and a test-retest reliability of 0.81. This testing was done in several samples of college students (12,19). In its large, multisite, National HIV Prevention Trial, the National Institute of Mental Health (NIMH) also developed a brief self-efficacy scale on condom use. It contains four items in five factors (including a total factor), and also had a Cronbach's alpha of 0.91. This testing was conducted with over 3,000 participants (20). More recently, a 9-item scale was developed to test condom use self-efficacy in members of the U.S. Navy (21). Each item in this instrument was rated on a 5-point scale indicating how confident the respondent was of his/her ability to perform the behavior. Cronbach's alpha of the original total scale was 0.93. Reliability and validity of the original scale was evaluated and reported (21). Several other instruments also have been developed to assess self-efficacy to prevent HIV through condom use over the past 20 years (22–25). Additionally, other

researchers have developed or modified single-item assessments of condom use self-efficacy (26,27).

HIV Medication Adherence—In 2007, Johnson and colleagues developed the HIV Treatment Adherence Self-Efficacy Scale for persons with HIV. This instrument assesses confidence to carry out important behaviors related to adhering to treatment plans. Participants respond on a 10-point Likert scale (0 = cannot do at all; 10 = completely certain can do). This 12-item instrument underwent psychometric testing with over 3,000 HIV-positive participants. It has a Cronbach's alpha of 0.90 and two identified factors: the 9-item Adherence Integration of treatment into daily life factor, and the 3-item Adherence Perseverance factor of ability to persevere when faced with HIV-related adversity (14). In response to the needs of participants with low literacy skills, Kalichman et al. (15) developed a visual analog scale to assess self-efficacy for antiretroviral therapy adherence. The scale was used to measure the participant's confidence in completing adherence-related activities. It is scored by measuring the distance from the left edge of the paper to the respondent's mark on the visual analog scale in millimeters, with a range of possible scores between 0 and 255 mm for each response. A total score is obtained by summing the six measurements and dividing by 6 to obtain a mean rating. This instrument was tested with over 100 HIV-positive participants in the United States and was found to have a Cronbach's alpha of 0.72 (28).

HIV Disease Management—Two instruments were found that assessed self-efficacy for specific disease management behaviors in persons with HIV. The HIV Self-Efficacy Scale is a 34-item adapted scale that measures two conceptual domains: managing medications and managing symptoms. Participants respond using a 10-point Likert scale indicating how confident they feel in their ability to manage various aspects of medications and symptoms (1 = not at all sure; 10 = totally sure). Internal consistency reliabilities for the original scale ranged from 0.88 to 0.97 (29). The second instrument, the Self-Efficacy Inventory Scale, is an 8-item, two-factor scale (30). It uses a 5-point Likert scale and asks participants to rate their confidence to perform HIV-specific cognitive behavioral and adherence skills. Its psychometric properties were tested with 391 English-speaking women (31).

The effectiveness, validity and reliability of the documented self-efficacy and HIV instruments has provided researchers and HIV clinicians with a useful way to assess their patients and develop appropriate treatment plans and interventions. The absence of a HIV symptom management self-efficacy scale for women is hindering the optimal care that can potentially be provided.

Importance of Symptom Management

Symptom management is a critical component of self-management in persons living with HIV/AIDS. The consequences of uncontrolled symptoms are decreased quality of life, suboptimal medication adherence and other disease complications (32,33). The literature supports the notion that effective symptom management can improve quality of life. The association between symptoms and HIV medication adherence is also well documented in terms of non-adherence and discontinuation of antiretroviral treatment (34–39). HIV is now considered by many a serious chronic disease and less of an acute, fatal one. However, a chronic disease trajectory is fraught with potential long-term complications. The gynecologic health issues that can develop in women with HIV are of particular concern (40,41). The adoption of effective symptom management strategies can help women living with HIV/AIDS live a more healthy and productive life. However, behavioral theory suggests that specific self-efficacy for symptom management must be enhanced prior to the adoption of such behaviors. Research has provided us with appropriate instruments to

measure self-efficacy in the context of various important HIV behaviors; however, a gap still exists in specifically measuring HIV symptom management self-efficacy of women.

Methods

Study Protocol

The data for this analysis come from a randomized, controlled trial over a three-month period that evaluated the effect of a peer-based intervention on symptom management in women living with HIV/AIDS. All participants were adult (≥21 years), self-identified as female, and had a documented HIV diagnosis. The study was conducted at several HIV clinics in the San Francisco Bay area. Institutional Review Board approval was obtained from each clinic's medical center. Participants were consecutively recruited from those responding to clinic advertisements. Project staff explained the research study to each patient, and individuals who consented to participate completed the baseline survey and were instructed to return the following week for randomization and further assessments. The baseline survey assessed demographic information, medical history, symptom intensity, and medication adherence. If they returned the next week, the participants were randomly allocated to either a peer-group health education intervention or an attention control condition, in which participants received a symptom management guide. Each participant was instructed to return every four weeks, for three months, to complete an instrument packet (for a total of four visits including baseline). This packet contained surveys on symptom intensity, medication adherence, quality of life and the new HSM-SEWS. The same survey packet was administered at each of the four participant visits. It is with this data, from the instrument packet, that we examined psychometric properties of the 9-item HSM-SEWS. Complete information on the larger trial's methodology, participant's characteristics, instruments used and intervention can be found in a previous publication (42).

Instrument Development

The HSM-SEWS was developed from the abbreviated Chronic Disease Self-Efficacy Scale (43). This abbreviated scale is a 6-item instrument derived from its original 33-item scale (44), measures four different dimensions: symptom control, role function, emotional functioning, and communication with physicians. All items are scored on a 0–10 scale and a final score is calculated as the mean of the six items, with a higher score indicating more self-efficacy. Internal consistency reliability of the abbreviated scale yielded a reliability coefficient of 0.91. The reliability and validity testing of the original 33-item and 6-item abbreviated scale can be found in the literature (43). This instrument is a general scale and is not specific to HIV disease. It is widely used in the chronic disease literature and is an acceptable self-efficacy assessment tool (43,44).

The newly developed HSM-SEWS included all six items from the abbreviated Chronic Disease Self-Efficacy Scale plus three additional, experimental items. These items address one's efficacy to manage side effects of HIV medications, to judge the need to see a physician due to changes in one's symptoms, and to develop a treatment plan to control symptoms collaboratively with one's physician. These additional items were supported by the literature on HIV/AIDS symptom management and reviewed in consultation with symptom management experts (45). In accordance with the documented psychometric properties of the abbreviated Chronic Disease Self-Efficacy scale, we predicted the HSM-SEWS would also assess one underlying factor of HIV symptom management self-efficacy.

The HSM-SEWS contains a total of nine items and has a Flesch Reading Ease score of 71.3 and Flesch-Kincaid 8th grade reading level. It is scored using a 10-point Likert scale, with 0

indicating that the participant is not at all confident in her ability to complete the symptom management task, and 10 indicating she is totally confident in her ability. The final score is calculated as the mean of the nine items, and a higher score indicates more self-efficacy

Statistical Analysis

Demographic data were analyzed using basic central tendency and dispersion statistics. To ensure that the HSM-SEWS measures what it is purported to measure, content validity was assessed. Prior to compiling the final instrument, a plan was developed to ensure adequate item sampling and construction. The literature on HIV/AIDS symptom management was thoroughly searched and experts in this field were consulted about potential items to include. Experts included researchers and clinicians specializing in HIV, symptom management and self-efficacy. After the instrument was fully constructed, this panel reviewed the instrument for face validity. They were asked to qualitatively evaluate the appropriateness and clarity of the additional items. All the experts agreed that the concept of symptom management self-efficacy was being measured appropriately.

The construct of self-efficacy is specific to the management of symptoms that result either from the HIV disease or its treatments. In order to validate the use of the HSM-SEWS in measuring this construct, we employed three commonly used methods: predictive validity, factor analysis and assessment of reliability. Predictive validity was assessed by conducting pairwise correlations between total symptom management self-efficacy and total symptom intensity in STATA SE version 10.0 (46).

In order to identify a factor structure that would account for the most variance among items and summarize the underlying correlational structure, an exploratory factor analysis of the baseline item responses was conducted. Assumptions were checked. Sample size did not meet the ideal standard of ≥20 cases per variable, but met the minimum standard of five cases per variable. Data are slightly skewed to the right, variables demonstrate linearity by scatter plots, no outliers were noted. Consistent with best practices in the field, the factor structure was extracted using factor analysis with oblique promax rotation in STATA SE version 10.0 (Stata Corporation, College Station, TX) (46). The number of factors retained was determined by interpretability of the structure of factor loading, the number of eigenvalues exceeding 1.00, and an examination of the post-estimation scree plot (47).

Reliability is often thought of as repeatability of results or as a summary of the amount of measurement error expected when using the instrument in a certain population (48). In assessing reliability of this instrument, we calculated internal consistency with Cronbach's alpha at each time point and overall.

Results

The 89 women who participated in this study had a mean age of 47 years; 76% self-identified as African American; 38.2% had less than an 11th grade education, and 41.6% had a GED or high school education. Additional demographic characteristics of the sample are presented in Table 1. No items or total scores of the demographic, symptom intensity, medication adherence or quality of life instruments were moderately or strongly correlated with the scale. Additionally, there were no differences between intervention and control groups on the HSM-SEWS ($t=-0.80$; $P=0.40$) at baseline but there was a significant difference at time 4 ($t=-2.73$; $P=0.008$).

The item, mean, standard deviation, and factor loading for each of the items on the HSM-SEWS at baseline are presented in Table 2.

Pairwise correlations by group and time, were conducted to assess predictive validity; however, due to limited sample size, (each group ranged from 19–42), these statistics are not reported. Total symptom management self-efficacy did increase and the total symptom intensity decreased while a behavioral intervention was ongoing. A small to medium effect size was found and a similar change was not found in the control group.

Exploratory factor analyses of the baseline data extracted one factor with eigenvalues exceeding 1.00 and factor loadings greater than 0.67. This factor had an eigenvalue of 5.45 and the range of factor loadings for the nine items was 0.67 to 0.89. This one-factor solution accounted for 93% of the variance among the items at baseline. A post-estimation scree plot also demonstrated that one factor was appropriate for the data.

The internal reliability of the HSM-SEWS was excellent, with an overall Cronbach's alpha of 0.92. Internal consistency was assessed at each data collection point. Every four weeks, the Cronbach's alpha was 0.92, 0.93, 0.87 and 0.83, respectively (see Table 3 for more information on reliability).

Discussion

The psychometric properties of the HSM-SEWS suggest that this new instrument is a valid and reliable self-report measure for women with HIV/AIDS. In intervention research studies, this instrument can be used to establish baseline levels and detect changes in symptom management self-efficacy.

The goals of symptom management behavior and the context in which this behavior is conducted are highly individualized, and this individualization complicates our ability to develop and test cognitive-behavioral interventions. Nonetheless, self-efficacy is a linking concept between intervention and consequent individual behavior change (7). An intervention that can increase self-efficacy also should lead to corresponding positive behavior change.

The intervention trial from which these data were drawn did not find a significant difference in symptom intensity between those who participated in the symptom management intervention and those who were in the control group (42). Correspondingly, it is not surprising that there were no differences in self-efficacy between the two groups at baseline but there was a difference at time 4. The control group had increased levels self-efficacy to manage their HIV-related symptoms compared to the intervention group at time 4. The control condition (the symptom management manual) was found to be more efficacious than previously thought and may have lead to increase in symptom management self-efficacy (6,42). The conclusion that the HSM-SEWS assesses self-efficacy specific HIV/AIDS-related symptom management self-efficacy in women, is consistent with these findings. Therefore, we propose that the HSM-SEWS could be used to understand further the relationship between intervention, self-efficacy, and symptom management behavior.

Previous research on persons with HIV/AIDS used symptom intensity and/or frequency as outcomes of the assumed symptom management process. A large, international, randomized clinical trial recently evaluated the effectiveness of the Symptom Management Manual: Strategies for People Living with HIV/AIDS versus a nutrition manual. Participants in this trial used a checklist in the manual to rate how intense 72 HIV-related symptoms were in a 24-hour period (6). Chiou et al. (2008) used outcomes such as quality of life, medication adherence, and viral control to measure the effect of the intervention. The HSM-SEWS could have elucidated the process by which the interventions increased symptom management and self-care abilities among participants living with HIV/AIDS.

Additionally, a recent pilot study evaluated the effectiveness of HIV symptom management screening in the Veterans Affairs electronic medical records system (49). The authors concluded that a new electronic clinical decision support tool trends towards increasing symptom awareness among patients and health care providers and shows promise in clinical HIV care. While this study focused on medical interventions in response to intense symptoms, this screening tool could also support behavioral interventions. The HSM-SEWS could be used in conjunction with this screening tool to help systematically individualize behavioral interventions that will be most beneficial to patients dealing with very difficult symptoms. Clinical providers may be able to provide more focused support when they understand the specific area of symptom management a patient has stronger or weaker self-efficacy.

Limitations

This study had several limitations that should be considered when evaluating the usefulness of the HSM-SEWS. Symptom management is important to both men and women living with HIV/AIDS; however, this instrument has only undergone psychometric testing with women and male-to-female transgender, and as such, can only be considered valid for those genders.

Women self-selected into this study and some did not complete all four surveys, which could have biased our results. A larger sample may increase the strength of our findings. Nevertheless, multiple measures over three months increased the stability in our study's findings.

Conclusions

Interventions to improve symptom management behavior in people with HIV/AIDS exist, but no instrument had previously existed to measure the effect of HIV symptom management self-efficacy in women. The results from this study determined that the HSM-SEWS is a reliable and valid measurement instrument and should be used in interventions and research studies targeting this area of health care research. The limitations of this study suggest that additional research would enhance the existing work completed; nonetheless, the development of the HSM-SEWS has provided HIV self-efficacy researchers with a complementary tool to manage and potentially alleviate the symptom burden of many women living with HIV/AIDS.

Acknowledgments

Disclosures and Acknowledgments

This project was funded by training grants from the National Institutes of Health 1F31NR009910 & 5KL2RR024990, by the 2008 American Nurses Foundation/Western Institute of Nursing Research Grant and by grants from the University of California, San Francisco Graduate Division and the School of Nursing Century Fund.

We gratefully acknowledge the editorial support of Matthew McManus and Julia Anisimova.

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Table 1

Demographic Characteristics of Sample (*n*=89)

Mean age at baseline in years (range)	47.0 (27–72)
Gender (%)	
Female	74 (83%)
Transgender	14 (16%)
Race (%)	
African American	68 (76)
Hispanic/Latina	7 (7.9)
Caucasian	10 (11.2)
Native American Indian	1 (1.1)
Asian	1 (1.1)
Other	2 (2.3)
Education Level (%)	
11^{th} grade or less	34 (38.2)
High School or GED	37 (41.6)
2 Years of College/AA	13 (14.6)
College (BS/BA)	4 (4.5)
Master's Degree	1 (1.1)
Currently work (%)	9 (10)
Has Health Insurance (% yes)	84 (94.3)
HIV RNA (1000/mL)	3.75
Baseline CD4 (cells/µ1)	464.4 (SD=257.6)
Mean HIV Duration in years	24.1
Current ART Use (%Yes)	64 (72.7)
Year started ART (range)	2003 (1997–2008)

Table 2

Mean, Standard Deviation and Factor Loading of Each Item at Baseline

Item	Mean[b]	Standard Deviation	Factor Loadings[c]
1. How confident are you that you can keep the fatigue caused by your HIV from interfering with the things you want to do?	6.25	2.75	0.72
2. How confident are you that you can keep the physical discomfort or pain related to your HIV from interfering with the things you want to do?	6.02	3.12	0.84
3. How confident are you that you can keep the emotional distress caused by your HIV from interfering with the things you want to do?	5.97	2.81	0.76
4. How confident are you that you can keep any other symptoms or health problems from interfering with the things you want to do?	6.05	2.84	0.76
5. How confident are you that you can do the different tasks and activities needed to manage your HIV so as to reduce the need to see your doctor?	6.27	2.89	0.89
6. How confident are you that you can do things other than just taking medication to reduce how much the illness affects your everyday life?	6.79	2.92	0.86
7. How confident are you that you can control the side effects of your medications?[a]	6.25	3.40	0.67
8. How confident do you feel that you can judge when you need to see a doctor due to symptoms related to your HIV and its treatment?[a]	7.36	3.11	0.78
9. How confident do you feel that you can develop a treatment plan to manage your HIV-related symptoms with your doctor?[a]	7.50	2.94	0.72

[a] Items added to the Chronic Disease Self-Efficacy Scale based on literature and expert review.

[b] Possible item range was 0–10.

[c] Factor loadings in the one-factor solution; conducted using exploratory factor analysis with oblique promax rotation using baseline data.

Table 3

Internal Consistency of the Instrument over Time[a]

Time	Overall Coefficient Alpha	Control Group	Intervention Group
Baseline	0.92	0.92	0.93
Six Weeks[b]	0.93	0.93	0.93
Ten Weeks	0.87	0.86	0.87
Fourteen Weeks	0.92	0.95	0.88

[a]Reliability was assessed using Cronbach's coefficient alpha measuring the internal consistency of the instrument.

[b]There was a two-week wash out period between baseline and the start of the intervention.