Development and Testing of a Scale To Measure Self-Efficacy for Pelvic Muscle Exercises in Women with Urinary Incontinence

Barbara A. Shelton Broome

Urinary incontinence (UI) is a physiologic disorder that can have psychologic, sociologic, and economic consequences for patients and their families (Agency for Health Care Policy and Research [AHCPR], 1996). Urinary incontinence is the involuntary loss of urine (The National Institutes of Health Urinary Incontinence Consensus Conference, 1989). An estimated 15% to 35% of the adult ambulatory population 60 and older that live in the community suffer from UI. The prevalence rates for women are twice that of men (AHCPR, 1996). The actual prevalence of UI may be higher than reported since many sufferers fail to report the occurrence of UI to their health care provider. Reasons suggested for the failure to report UI is that many individuals may believe UI to be a normal phenomena associated with aging or that UI is untreatable, therefore not worth discussing (Baum, Suarez, & Appell, 1991; Burgio, Ives, Locher, Arena, & Kuller, 1994; Smith, Newman, & Blackwood, 1992). The National Association for Continence estimates that of the 13 million Americans with incontinence, 85% are women (personal communication, July 17, 1997).

Consequences of UI

Involuntary loss of urine has multiple implications for the sufferer (NIH Urinary Incontinence Consensus Conference, 1989; Ouslander & Schnelle, 1995). The individual suffering from UI may avoid social situations to prevent embarrassment related to leaking and odor (Ashworth & Hagan, 1993; Dowd, 1991; Hunskaar & Vinsnes, 1991). Others have noted that UI may impact quality of life and be a major barrier to social interests, entertainment, or physical recreation (Grimby, Milsom, Molander, Wiklund, & Ekelund, 1993; Hunskaar & Vinsnes, 1991; Wette et al., 1995). Those individuals with UI who are socially active often incorporate elaborate plans and precautions into their activities to avoid urinary leakage and to maintain secrecy about their UI (Dowd, 1991; Jeter & Wagner, 1990). Depression and anxiety may occur in incontinent persons (AHCPR, 1996; Burgio, Whitehead, & Engel, 1985; Grimby et al., 1993; MacCaulay, Stern Holmes, & Stanton, 1987; Rosenzweig, Hischke, Thomas, Nelson, & Bhatia, 1991).

UI is also very costly. The total cost of UI in 1995 was approximately $16.4 billion annually. Of this total, $11.2 billion were spent for community-dwelling individuals and an additional $5.2 billion was spent on continence care in nursing homes (AHCPR, 1996; National Association for Continence, personal communication, July 17, 1997).

During the past 15 years, attention has focused on the treatment of this common problem. The NIH Urinary Incontinence Consensus Conference (1989) recommended that the least invasive and lowest risk intervention be used first in treating UI. The AHCPR Urinary Incontinence Guideline Panel (1992; 1996) concurs with the consensus statement. Behavioral interventions, such as pelvic muscle exercises, meet the criteria of low risk and minimal invasiveness (AHCPR, 1996; NIH Urinary Incontinence Consensus Conference, 1989). Pelvic muscle

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exercises require active patient participation, thus motivation and belief that the exercises are beneficial are important to success.

Types of Incontinence

UI is classified as either acute or chronic. Acute or reversible UI refers to episodes of incontinence that are of a sudden onset, usually related to an acute illness or an iatrogenic problem (Kane, Ouslander, & Abrass, 1994). Some common causes of acute UI include medications such as diuretics, anticholinergics, calcium channel blockers, or alpha-adrenergics. These medications alter the micturition process and change bladder and sphincter dynamics (AHCRP, 1996; Baum et al., 1991; Kane et al., 1994). Other reasons for an acute episode of UI include restricted or limited mobility, urinary tract infections, or medical conditions that create an increase in fluid volume states, such as occurs in congestive heart failure and poorly controlled diabetes mellitus (Kane et al., 1994). When the underlying precipitating event is removed, the UI is resolved.

Chronic or persistent UI is unrelated to an acute illness. Chronic UI can become worse over time (Engberg, McDowell, & Wilkerson, 1996; Kane et al., 1994). Types of chronic or persistent UI are stress, urge, and mixed (Engberg et al., 1995; Kane et al., 1994). Stress UI is the involuntary loss of small amounts of urine that can occur when the intravesical pressure exceeds the maximum urethral pressure (Abrams, Blaivas, Stanton, & Anderson for the International Continence Society Committee on Standardization of Terminology, 1990). This occurs during activities that increase intra-abdominal pressure such as coughing, laughing, or lifting (Engberg et al., 1996; Kane et al., 1994). Urge UI is the involuntary leakage, usually of large amounts of urine, associated with an abrupt and strong desire to void (Abrams et al., 1990; Engberg et al., 1996). Urge incontinence may be idiopathic or associated with involuntary detrusor contractions or hypersensitivity. Neurologic disorders, such as a cerebral vascular accident, can also be associated with urge UI (Abrams et al., 1990). Often, no specific etiology can be identified despite detailed evaluation (NIH Urinary Incontinence Consensus Conference, 1989).

Symptoms of both stress and urge UI are called mixed UI (Houston, 1993). Mixed UI is common in older women. Usually either stress UI or urge UI will be predominant. Stress UI in older patients with mixed UI has usually been of a long duration with urge UI occurring more recently (Diokno, 1990).

Treatment

Treatment of UI is based on a thorough assessment to confirm the presence of UI, the type of UI, identifying contributing factors, and determining patients who may require further evaluation prior to any therapeutic interventions (AHCRP, 1996). The information obtained during assessment is also vital in setting up the appropriate treatment for UI.

Treatment and interventions for UI include medications, mechanical devices, surgery, and behavioral modification. Several medications have proved beneficial for UI; however, risk to benefit ratios are unclear (AHCRP, 1996). The side effects of the pharmacologic agent used, the characteristics of the UI, and patient and physician preference must all be weighed in the decision to use medications as an intervention (Kane et al., 1994).

Surgery has also proven effective and may be indicated in certain cases of stress UI that are not responsive to pharmacologic and behavioral interventions (Kane et al., 1994). However, the long-term results of surgery for UI remain under investigation. Mechanical devices such as urethral plugs, weighted vaginal cones, and pessaries have been effective in selected situations (AHCRP, 1996).

Behavioral interventions have been successful as a treatment for stress and urge UI (Burgio, Courtland-Robinson, & Engel, 1986; McDowell, Burgio, Dombrowski, Locher, & Rodriguez, 1992), although the long-term effects of these therapies also need further study (AHCRP, 1996). Behavioral interventions are noninvasive, free from side effects, and can be used with other treatment (AHCRP, 1996; NIH Urinary Incontinence Consensus Conference, 1989). Behavioral interventions include pelvic muscle exercise (Kegel exercises).

Historical Perspective

Pelvic muscle exercises (PMEs) are based on the research of Dr. Arnold Kegel (1948, 1952). Kegel’s research provided the foundation for PMEs as a behavioral intervention for UI (Kegel, 1952, 1956). Kegel (1948) noted that during childbirth there was a stretching and tearing of the perineal muscles with possible nerve injury. He believed it was not enough merely to approximate the margins of lacerated muscles and fascias and restore the gross perineal structures to return normal function. He proposed that a return to function requires a demand for use and suggested perineal exercises to: (a) promote a return of normal muscle function postpartum, and (b) restore muscle function in women still of the childbearing age to prevent a relaxation of the pelvic musculature in the future. Kegel proposed PMEs as a means to restore and strengthen visceral tone and pelvic muscle function after childbirth (Kegel, 1948; 1951; 1952; 1956). The exercises involved are directed toward “drawing in the perineum” (Kegel, 1948, p. 242) to restore normal muscle function.

Self-efficacy expectations and outcome expectations play a role in behavioral change (Bandura, 1986). Measuring self-efficacy expectations and outcome expectations for pelvic muscle exercises can assist in assessing individual perceptions.
of PME performance and outcomes. Based on this assessment, interventions may then be tailored to enhance skill mastery and self-efficacy. Success of behavioral interventions may be related to one’s self-efficacy (Bandura, 1977a). Self-efficacy reflects one’s confidence to perform specific behaviors, such as PMEs, and one’s belief that the performance of the behavior will produce a specific outcome (Bandura, 1977a; 1982; 1986).

Self-efficacy is a domain-specific construct; therefore, a propensity for performing one behavior does not necessarily transfer to other behaviors (Bandura, 1977a; 1977b; 1986). Because the behavior does not necessarily transfer, it is necessary to develop behavior-specific measures for the construct under study (Bandura, 1989; Hofstetter et al., 1990). This enables interventions to be individually tailored to increase and reinforce self-efficacy for the specific behavior.

Measures of self-efficacy have not been a part of the detailed physiologic and psychosocial UI assessment (AHGPR, 1996; Engberg et al., 1996). The measurement of self-efficacy for performing PMEs as a behavioral intervention for UI can provide important information regarding one’s motivation and belief about the efficacy of the prescribed intervention. The measurement of self-efficacy may also provide a foundation for better understanding the relationship between self-efficacy and successful outcomes (Gembow-ski et al., 1993; Hofstetter et al., 1990).

Purpose

The purpose of this research was to (a) develop a scale that can be used to measure perceived self-efficacy and outcome expectations for performing PMEs and strategies to prevent urine loss in women with UI, and (b) determine the reliability and validity of the self-efficacy scale using a group of women age 50 and older.

The scale developed by this researcher may provide clinicians with an instrument assessed for reliability and validity to measure self-efficacy for PMEs. If self-efficacy is a factor affecting learning pelvic muscle exercise, interventions that foster positive self-efficacy can be developed and incorporated into a behavioral program using PMEs to treat UI.

Phase I: Developing the Self-Efficacy Scale

Identification of construct. The major construct identified in this study was self-efficacy as related to the performance of PMEs. Questions developed for the self-efficacy scale were consistent with the two domains of self-efficacy: perceived performance expectations and outcome expectations (Bandura, 1977a; 1977b; 1986).

Generation of an item pool. A pool of 60 items was generated based on the construct of self-efficacy related to PMEs. The items reflected the two domains of Bandura’s theory of self-efficacy. Items were neutrally worded to avoid the introduction of bias (DeVellis, 1991).

Determining the format for measurement. The format for measurement was a rating scale. Rating scales are useful when measuring opinions, beliefs, and attitudes (DeVellis, 1991; Nunnally & Bernstein, 1994). Scaling was in ten-point intervals, which was encouraged by Bandura to provide subject response variability (A. Bandura, personal communication, October 10, 1995). Scores can range from 0 to 100%. A score of zero suggests no belief in the ability to perform the indicated behavior or in outcome expectations, while a score of 100 suggests complete belief in ability to perform the indicated behavior or in outcome expectations.

Initial item pool reviewed by experts. DeVellis (1991) suggested experts critique the relevancy, clarity, and conciseness of each item to the phenomena being measured. The item pool was reviewed by three experts in UI and two experts in self-efficacy. The experts were also asked whether additional items should be added to the pool. Based on the advice of these experts, some items were eliminated and others revised.

The development to this point resulted in a 23-item scale that was divided into two subscales: efficacy expectations and outcome expectations. Part A is a 14-item subscale that examines efficacy expectations by asking subjects to respond to items illustrating a variety of situations. Subjects are asked to indicate how confident they are in performing activities such as contracting pelvic muscles, performing pelvic muscle contractions while lying down, standing, and sitting. Part B of the scale is a nine-item subscale that examines outcome expectations. In part B, subjects indicate their confidence that the activity (performance of PMEs) will prevent unwanted urine loss. Some of the situations included in the scale are coughing, sneezing, laughing, and waiting in line for a restroom. Using a rating scale of 0 to 100, the subjects circle the number that best responds to their performance of and belief that PMEs will prevent unwanted urine loss in certain situations.

Subscores are averaged. Total scores for parts A and B are averaged for a total scale score. The score ranges are from 0 to 100. The higher the score, the greater the person’s perceived efficacy and outcome expectation. The range of scores are 0 to 32 (low self-efficacy), 33 to 66 (moderate self-efficacy), and above 66 (high self-efficacy). These ranges were based on the total possible score equally divided. The scores can then be used to assess a person’s perceived efficacy expectation and outcome expectations. The reading grade level of the Broome Pelvic Muscle Self-Efficacy Scale (Broome PMSES) is 8.3.

Phase II: Testing the Scale

Testing the scale involved
administering the scale to a sample of community-dwelling women with UI. A small sub-study of a group of women treated with PTMs at continence clinics for UI also completed the scale before treatment.

A sample of 115 community-dwelling women age 50 and older with UI were recruited from multiple sites in northeastern Ohio to collect data for examining the technical qualities of the scale. In addition to the community sample, a small clinic sample of 20 women were recruited from continence clinics in Pittsburgh and Northeastern Ohio. Using the Broome PMSES, data were collected from subjects before and after treatment for UI using PME. A dichotomous question regarding perception of success or not being successful eliminating or decreasing accidental urine loss using PME was also completed.

Inclusion criteria for participation required that the subjects:
1. Be cognitively intact as determined by The Clock Test (Tuokko, Hadjistavropoulos, & Beattie, 1995).
2. Have self-reported at least one symptom of urge, stress, or mixed urge and stress UI. The symptoms of urge incontinence described included leaking on the way to the bathroom and sudden urgency to urinate but leaking urine before reaching the bathroom. Stress was described as the loss of urine when laughing, coughing, lifting, or sneezing, and mixed incontinence included symptoms of both urge and stress incontinence.
3. Be a woman age 50 and older.
4. Have the ability to hear, see printed material, and understand verbal and written English. An additional criterion for the subsample was the completion of behavioral treatment (for example, PMEs) at a continence clinic. The community sample was recruited from a population of urban and suburban women 50 years of age and older living in northeastern Ohio. Selection sites were three sites of the Senior Citizen Organization for Personal Enhancement (SCOPE), three different General Motors Retiree union groups, health-related events at African-American and Caucasian churches, and at senior citizens’ complexes.

Subjects for the small comparative portion of the study were recruited from the Benedum Geriatric Center Continence Clinic at the University of Pittsburgh and a urology group practice in northeastern Ohio. The inclusion criteria were the same as the larger study previously discussed. Patients were informed by the practitioner at each site. Representation of Caucasian and African-American women in this study was promoted by selecting community sites for recruitment that have large African-American or Caucasian populations. Informed consent was obtained from all subjects.

A test-retest sample (N=49) was randomly generated from the community sites 14 days after the initial completion of the questionnaire.

**Instrumentation**

Instrumentation for this study evaluated cognitive status, depression, and quality of life. Demographic data were collected for all participants.

Cognitive status was a screening variable measured by the Clock Test. Subjects were asked to draw the face of a clock, write in the numbers in the appropriate place on the clock face, and to place the hands at a specific time given by the researcher. Scores range from 1 to 10 with the higher numbers showing less impairment. The Clock Test has good sensitivity (86.7%) and specificity (92.7%; Tuokko et al., 1995).

The Geriatric Depression Scale (GDS) measured depression (Yesavage et al., 1983). The GDS is a 15-item dichotomous response format, developed in 1983 by Yesavage to measure depression in nursing home and community elderly. Scores range from 0 to 15. The scoring for the GDS was 0 to 4 (mild depression), 5 to 9 (moderate depression), and 10 to 15 (severe depression). The GDS has been validated for community, well-elderly, and hospitalized elderly (Hamilton, 1967; Steuer, Mintz, & Hammen, 1984). Reliability measured by alpha coefficient (r=.94), split half reliability (r=.94), and test-retest reliability (r=.85) has been established. Convergent validity was determined by positive correlations with The Zung Self-Rating Depression Scale (r=.84) and the Hamilton Rating Scale (r=.83) for Depression (Yesavage et al., 1983).

Quality of life was measured by The Incontinence Impact Questionnaire-Short Form (Uebtersax et al., 1995). The Incontinence Impact Questionnaire-Short Form (IQ-SF) consists of items that reflect symptoms associated with UI and the way that UI interferes with different aspects of daily living (Shumaker et al., 1994). Responses range from 0 (not at all) to 3 (greatly). The average score of items is multiplied by 33.3, so that scores are on a scale of 0 to 100 (Uebtersax et al., 1995). The IQ-SF correlation with the IQ-long form (Shumaker et al., 1995) total was .97. The correlation of the short form subscales with the long form was .99 to .94 (M=.91). Test-retest (r=.71), subscale ranges for Cronbach’s Alpha (r=.48 to .90), criterion (r=.84), and convergent (r=.37 to .52) validity of the scale with Urge/Urinary Distress Inventory for measures of validity has been reported (Uebtersax et al., 1995).

Demographic information about race, marital status, and age were collected using a form developed for this study by the researcher. To better understand any variables that may affect behavior, education and employment data were collected. General information about the
participant’s experience with UI and any past treatment was also obtained.

Data Management

Data were collected by the researcher at each testing site. Missing data were minimized by the researcher assessing each packet for completion prior to the subject leaving the testing site. The researcher attempted to collect all missing data by questioning the subject. The researcher did not include participants who did not answer three or more applicable questions. All data were entered into SPSS-PC. Measures to maintain the confidentiality of the data were ensured by placing the data in a locked file when not in use. The subject’s name did not appear on any of the data. The completed instrument packets were identifiable only by a code number.

Data Analysis

Indices of reliability and validity were calculated in addition to descriptive statistics. Demographic information and estimates of reliability and validity were also analyzed.

The sample for this study consisted of 115 ambulatory, cognitively intact, community-dwelling women recruited from social and religious community organizations. All women included in the study reported experiencing UI. The races of the women were Caucasian (65.2%), African American (27%), Hispanic (9%), American Indian (1.7%), Asian (9%), and Biracial (4.3%). The majority of the women were married (50.4%), between the ages of 50 and 60 (65.2%), and lived with a spouse (52.2%). Almost two-thirds (64.3%) of the women in the study sample are currently employed. Sixty-nine (60%) reported an educational level within grades 9 through 12 and 38 (33%) reported some college education.

The women were queried regarding events that precipitated their UI. Structured and open-ended questions were used to help establish cause and type of UI experienced. More women reported loss of urine with activities that were indicative of stress UI. Ninety-three (80.9%) of the women reported a loss of urine associated with sneezing, coughing, or lifting. In comparison, 74 (64.3%) affirmed urine loss with activities associated with urge incontinence, such as experiencing a loss of urine while on the way to the toilet.

An open-ended question was added so that participants could give information about other times that leakage occurred. Thirty-three (28.7%) of the participants reported other times when leakage occurred. The other precipitating events of leakage included riding in a car, aerobics, sitting still, waiting too long before going to the bathroom, and standing too long. The mean length of time the women had been incontinent was 2.9 years (SD=1.3).

The survey questions regarding treatment of incontinence asked: (a) Have you ever (been evaluated) seen a doctor or nurse and had an examination for this problem? (b) Have you had treatment for the problem of leaking urine? If the women had treatment, the next questions asked were: (c) What type of treatment have you had for the problem of leaking urine? (d) Was this treatment effective? The final question asked the women if they are still using the treatment. Of the total sample, 35 (30.4%) of the 115 women completing the survey reported being evaluated for incontinence by their health care provider. Thirty-one (27%) women had treatment initiated by a health care provider, while 9 (8%) started self-treatment using PMEs. Of the 31 subjects who reported treatment for UI by a health care provider, 14 (45%) were prescribed PMEs, 10 (32%) had surgery, and 7 (23%) were treated with medication. Eleven (36%) of the women who had received treatment for UI evaluated the treatment as very effective, 14 (45%) reported the treatment as somewhat effective, and 6 (19%) found the treatment to be not at all effective. Of the 21 women who received PMEs or medication as treatment, 14 (66%) women continued the prescribed treatment.

The women completed the B roome PMSES, the GDS, and the IQ-SF. Scores on the 23-item B roome PMSES that were above 66 were considered to have high self-efficacy, scores between 33 and 66 had moderate self-efficacy, and scores below 33 were considered indicative of low self-efficacy. Based on the Broome PMSES scores, 68 (59%; M=45.21; SD=10.43) had high self-efficacy for performing PME, 42 (37%; M=54.09; SD=9.75) had moderate self-efficacy, and 5 (4%; M=22.86; SD=9.2) of the women had perceived low self-efficacy.

GDS scores indicated that 92 (80%; M=1.43; SD=1.31) of the women scored within the normal range (scores between 0 and 5) and were not considered depressed, 17 (15%) (M=6.33; SD=1.84) were moderately depressed (scores between 6 and 10), and 6 (5%) (M=11.16; SD=1.69) were severely depressed (scores greater than 10). The criteria identified by Yesavage and colleagues (1983) were used for scoring the depression scale.

The responses of the women to the IQ-SF indicated that 88 (77%; M=10.23; SD=9.52) of the women perceived that UI did not or only slightly affected their quality of life. Nineteen (17%; M=48.13; SD=5.79) women reported that UI moderately affected their quality of life, and 8 (6%; M=78.23; SD=13.47) reported UI had a severe impact on their quality of life. These data provide an overview of the sample’s perceived self-efficacy, quality of life, and feelings of depression.

Psychometric Analysis of the Broome PMSES

The Broome Pelvic Muscle Self-Efficacy Scale is a rating scale with responses ranging from 0 to 100 in increments of 10. Internal consistency reliability was estimated by Cronbach’s
Alpha for the total scale and the subscales of efficacy expectations (part A) and outcome expectations (part B). Table 1 reports these coefficients for the sample of 115 women. The alphas for all scales are high and meet the criterion for acceptable reliability indicated by Nunnally and Bernstein (1994). The alphas for all the scales remained stable (between .967 and .969) even if each item was individually deleted.

The stability of the scale was estimated by the test-retest method. Eighty-six (75%) of the total sample randomly received the scale to complete 14 days after the initial evaluation. Results of correlating scores across the two administrations are presented in Table 1. The moderate stability of the scale may be related to the construct being measured. Self-efficacy is a state and may change over time based on a person’s performance of an activity and the outcome of that activity.

The reliability estimates were compared by subgroups of the community sample to determine whether the scale retains its internal consistency and test-retest reliability for these groups. Although these subgroups are quite small, the data provide some preliminary results.

Reliability estimates were calculated for African-American and Caucasian women separately. It was also calculated for those women who reported having had treatment for UI and those who had not. There were nine women identified as other. The races of these women were Hispanic (1), American Indian (2), Asian (1), and biracial (5). These nine women not identified as African American or Caucasian were not included in the subsample analysis of treatment by race. Tables 2 and 3 report those coefficients.

The alpha reliability estimates in the subsamples of African-American and Caucasian women are comparable to those found for the total group. The test-retest estimates for Caucasian women were higher than those for the African-American women. Reasons for the lower estimates in the subsample of African Americans may be the small sample size and that self-efficacy is a state that changes over time.

Internal consistency was also compared in women who had and did not have previous treatment for UI. Again, the alpha estimates were high for both treatment and no treatment groups. The stability estimate for the treated group was lower for efficacy expectations, but higher for the outcome expectations section of the scale. It must be remembered that the treatment occurred before any data collection and the higher stability estimate for outcome may reflect the knowledge gained from treatment, although not all treatment involved PME. Another factor that may affect stability is self-efficacy, which may change over time because it is a state. Stability of the total scale was .65 or greater for the treatment and no treatment groups.

For the total sample of 115 women, items were correlated with the corresponding corrected scale total to examine whether any items did not relate well enough to be retained. Based on the moderate to high correlations (.60 to .89), it was decided not to delete any items.

To examine the relationship of items within each of the two scales (efficacy expectations and outcome expectations), the items were correlated. The correlations provide evidence that item scores can be averaged to form an efficacy and an outcome scale score. They also help to explain the high internal consistency reliability estimate.

The correlation between efficacy expectation scores and outcome expectation scores was computed. A moderately positive correlation between efficacy and outcome scales was expected and a correlation of .65 was obtained. This results in a shared variance of 42% which empirically supports the theory of two components of self-efficacy on which this scale was based.

Content validity of the Broome PMSES was established by having experts in the fields of self-efficacy or urinary incontinence evaluate the instrument for sampling adequacy. The experts in the area of UI were all doctorally prepared nurse educators and active clinicians in UI evaluation and treatment. The experts in self-efficacy theory had doctorates in psychology. The Broome PMSES was sent to the experts with a cover letter asking for their evaluation of the adequacy of the content for the domain of self-efficacy or UI. Comments received from the experts were used to modify the instrument prior to administration.

Data were also collected to examine the construct validity of the Broome PMSES. After an exhaustive search of the literature, no other instruments with reported reliability and validity that examine self-efficacy and PME were found. However, the literature does report a relationship between quality of life, depression, and self-efficacy. The higher the perceived self-efficacy, the better the quality of life (Carroll, 1995; Ewart et al., 1986; Grembowski et al., 1993). Reported depression is also

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<tr>
<td>Efficacy (Part A)</td>
<td>70.98</td>
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<td>Outcome (Part B)</td>
<td>62.17</td>
<td>(22.14)</td>
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<td>67.57</td>
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lower when self-efficacy is high (Bandura, 1982; 1986; Grembowski et al., 1993; Yusaf & Kavanagh, 1990).

The Broome PMSES was examined with respect to these reported relationships. The GDS (Yesavage et al., 1983), as a measure of depression and the IIQ-SF (Shumaker et al., 1994) as a measure of quality of life. For this community sample the coefficient alpha reliability estimates for the GDS was .71 and for the IIQ-SF was .90.

The GDS identifies the responses that are most likely to be indicative of a mood disorder and one point is assigned each response. Thus, the higher the sum, the greater the depression. The lower the score on the IIQ-SF, the better the quality of life. On the Broome PMSES, the higher the score, the greater the perceived self-efficacy. Therefore, the Broome PMSES would be expected to correlate negatively with the GDS and IIQ-SF. Correlations between the Broome PMSES and the depression and quality-of-life scales are presented in Table 4.

The correlations of the Broome PMSES with the GDS and IIQ-SF were moderate and in the anticipated direction, providing some initial evidence for the construct validity of the scale. The correlations for construct validity have not been examined in other studies; therefore, other studies examining self-efficacy, depression, and quality of life are encouraged.

A principal components factor analysis was conducted to examine the factor structure of the Broome PMSES. The scale was developed to yield two scores: efficacy expectation and outcome expectation. Factors were extracted using the Kaiser criterion of retaining factors with eigenvalues greater than 1.00. The first factor had an eigenvalue of 13.98 (60.8%) and the second factor an eigenvalue of 3.10 (13.5%). A varimax rotation was done. Questions 1 through 14 (part A) loaded highly on factor one (efficacy expectations) and questions 1 through 9 (part B) loaded on the second factor (outcome expectations). Therefore, the factor structure that was designed in the Broome PMSES was confirmed.

The construct validity of the scale was further examined in a clinic setting comparing the self-efficacy scores of women who

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<th>Table 3. Reliability Estimates by Prior Treatment</th>
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reported success and those who perceived themselves as not being successful in eliminating unwanted urine loss following treatment using PME. It was hypothesized that self-efficacy would be greater in those women who were successful in decreasing or eliminating unwanted urine loss than those who were not successful.

The clinic sample consisted of 20 women treated for UI at a continence clinic. The majority of the women were Caucasian (90%), married (60%), between the ages of 50 and 60 (40%), and lived with a spouse (55%). Twelve (55%) of the subjects were over age 60. The women in the clinic sample almost equally reported loss of urine with activities that were indicative of stress and urge incontinence. For example, 19 (95%) reported a loss of urine when sneezing, coughing, or lifting and 17 (85%) of the women leaked urine on the way to the toilet. Six (30%) of the participants reported other situations in which leakage occurred. Three (15%) women reported walking caused leakage. Waiting too long before going to the bathroom (5%), driving (5%), and stressful times in life (5%) were reported independently by the remaining three women.

The mean length of time the women were incontinent was 3.2 years (SD=.95). Of the clinic sample women, 12 (60%) reported being previously evaluated by their health care provider for UI. Six (30%) had prior treatment initiated by a health care provider, while 1 (5%) woman started treatment on her own. Of the six women who received prior treatment by a health care provider, 3 (50%) had surgery, 2 (33%) used medication, and 1 (17%) used PMEs. Of the six subjects who reported treatment, 2 (33%) reported the treatment as very effective, 2 (33%) reported the treatment as somewhat effective, and 2 (33%) reported the treatment as not effective at all. Only 1 (17%) woman continued to use the treatment.

The women completed the Broome PMSES. Scores on the 23-item scale that were above 66 were considered to have high self-efficacy, scores between 33 and 66 were moderate self-efficacy, and scores below 33 were considered indicative of low self-efficacy. Based on the Broome PMSES scores, 8 (40%); M=84.0; SD=11.3) women had high self-efficacy for performing pelvic muscle exercise, 11 (55%); M=58.09; SD=10.95) had moderate self-efficacy, and 1 (5%); M=34.4, SD=0) had low self-efficacy. The clinic had a lower percentage of women with high self-efficacy and a higher percentage with moderate self-efficacy when compared to the community group. Rates were similar between the groups for low self-efficacy.

The women were instructed in the performance of PME by the continence clinic practitioner. Following completion of treatment, a self-report dichotomous scale was used in the clinic sample to identify women who perceived they were successful or not successful in preventing or decreasing urinary accidents. Of the 20 women in the clinic sample, 12 women reported fewer urinary accidents and 8 reported no fewer urinary accidents on a dichotomous response scale. The psychometric analysis of the findings of the two groups identified in the clinic sample provide preliminary evidence for construct validity of the Broome PMSES (see Table 5).

In the clinic sample (N=20), those women who reported they were successful in decreasing accidental urine loss on the eva-

<table>
<thead>
<tr>
<th>Scale</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geriatric Depression Scale</td>
<td>-.25*</td>
</tr>
<tr>
<td>Incontinence Impact Questionnaire</td>
<td>-.36*</td>
</tr>
</tbody>
</table>

Note: * p<.01

Table 4. Correlation of the Broome PMSES with a Measure of Depression and a Measure of Quality of Life

Summary of Results

The psychometric properties of the Broome PMSES were examined in a group of cognitively intact community-dwelling women age 50 and older. The Broome PMSES was further examined in a clinic sample of women age 50 and older before pelvic muscle exercise intervention for UI.

In the community group, internal consistency for the total scale was .97. The coefficient for the subscales of efficacy (part A) and outcome (part B) was .97 and .96, respectively. Subgroup reliabilities for African-American and Caucasian women for the total scale and subscales remained in the 90s.
Table 5.
Means, Standard Deviations and One-Tailed Tests on Broome Self-Efficacy Scale by Outcome Category

<table>
<thead>
<tr>
<th>Scale</th>
<th>No Fewer Accidents (No Improvement) (N=8)</th>
<th>Fewer Accidents (Improvement) (N=12)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Efficacy</td>
<td>56.61</td>
<td>13.63</td>
</tr>
<tr>
<td>Outcome</td>
<td>56.53</td>
<td>15.22</td>
</tr>
<tr>
<td>Total</td>
<td>56.58</td>
<td>12.53</td>
</tr>
</tbody>
</table>

Alpha coefficients between women in the community group who did and did not undergo previous treatment were in the 90s for all subgroups. The alpha coefficients for Caucasian and African-American women also remained high. The Medical Outcomes Study (MOS) and the State-Trait Anxiety Inventory (STAI) did not report findings for subgroups in their respective studies (Stewart, Hayes, & Ware, 1992). Stewart and colleagues (1992) stress the need to test reliability across groups with diverse characteristics to ensure minimum standards among the groups. The findings for the subgroups are preliminary and should be interpreted with caution. The subgroups were small and more powerful studies are needed.

The inter-item correlations for the subscales were high. Efficacy expectation inter-item correlations ranged from .50 to .65 and outcome expectation ranged from .61 to .94. This high inter-item correlation suggests high homogeneity of the scale as well as redundancy across items. Correlations between .3 and .7 are considered acceptable for inter-item correlations for multi-test items. Each item makes a contribution to the scale (Nunnally & Bernstein, 1994), correlates with the other items on the scale but with minimal redundancy. Items that have very high correlations may be measuring the same thing and one item would provide sufficient information about the area being measured. In the case of the Broome PMSES, the high inter-item correlations among the items suggest redundancy and a case for brevity can be made (DeVellis, 1991). However, shortening the scale may pose a risk of losing some of the true meaning of the scores (DeVellis, 1991). The risk of losing the true meaning of self-efficacy as it relates to the performance of PMEs should be considered when taking into account that self-efficacy is not global but domain specific (Bandura, 1977a; 1977b; 1986). Maddux (1995) stressed that scales that fail to examine self-efficacy relative to a specific behavior result in very little beneficial research-related behavioral change. Thus, brevity may decrease redundancy but may result in inadequate or minimal data from the area under investigation.

The interval time for stability measures of the Broome PMSES was 2 weeks. This time frame was selected because temporal stability becomes lower the longer the interval between testing (Nunnally & Bernstein, 1994). However, if the time period between testing was too short, recall is a concern (Green & Lewis, 1986). The Broome PMSES had moderate stability in the community group and clinic groups. This may be related to the construct under evaluation. Self-efficacy is a state and may change over time.

The theory of self-efficacy has been used as a framework for the Broome PMSES scale development. Efficacy expectation and outcome expectation were examined and evaluated as separate components of self-efficacy. This concurs with Bandura’s suggestion that one’s belief in personal ability to perform a behavior does not infer the same level of belief in the outcomes of a behavior (Bandura, 1977a; 1986).

These findings support the theory of self-efficacy (Bandura, 1977a; 1977b; 1986; 1989; Maddux, 1995). Self-efficacy expectations and outcome expectations are conceptually distinct, but the types of outcomes people anticipate are determined by their expected performance. Both components play a role and are important predictors of behavior (Maddux, 1995).

Discussion
The predictive validity of the Broome PMSES is similar to other studies. The higher the initial self-efficacy, the more likely that the outcomes will be positive. Because there are no other scales that measure self-efficacy for performing PME, criterion validity or measure against a “gold standard” cannot be evaluated.

The psychometric analysis of the Broome PMSES provides preliminary reliability and validity; however, continued evaluation of its psychometric properties in other groups with UI is necessary before being used to predict self-efficacy for PME. Additional studies using equivalent groups to determine the reliability and validity will increase knowledge about the use of the Broome PMSES in these populations.

Further evaluation of post-treatment outcomes in the clinic sample should be objectively evaluated through the use of bladder diaries to get a more precise picture of decreases in urinary accidents. However, it is important to add a component of subjective appraisal of improvement, since self-efficacy expectation is affected the most by performance appraisal (Bandura, 1977a).
In summary, the psychometric analysis of the Broome PMSES provides an initial estimate of reliability and validity in a community and clinic sample of women. This sample was limited to women age 50 and older, ambulatory, and cognitively intact. Any psychometric analysis is a snapshot of the scale’s properties in a specific population. Use in populations that have different characteristics and of different races should always involve a pilot study to examine the properties of the scale when used in different samples. Removing items from a previously developed scale changes the psychometric properties of the scale (Green & Lewis, 1986). Therefore, any changes in a scale require re-evaluation of psychometric properties.

**Recommendations**

The Urinary Incontinence Guideline Panel recommends that the least invasive intervention for UI be used first (AHCPR, 1996). Pelvic muscle exercises meet this criterion. The success of behavioral interventions, such as PMEs, require patients who are motivated (AHCPR, 1996). One factor that may influence motivation is self-efficacy. Prior to the Broome PMSES, there was no scale with evaluated psychometric properties to measure self-efficacy for performing PMEs. This study has provided evidence that self-efficacy can be reliably measured for performing PMEs. Some preliminary evidence of construct validity was also provided in this study.

The Broome PMSES may be a useful way to measure the self-efficacy of a person for performing PMEs. The Broome PMSES can provide the clinician with knowledge about a person’s belief in personal performance and outcome expectations for PMEs to prevent unwanted urine loss. This knowledge may be useful in developing individualized patient intervention strategies to enhance self-efficacy.

**Future Psychometric Research**

The current psychometric study evaluated a scale that was designed to measure the self-efficacy for performing PME in ambulatory, active community dwelling women. Because the sample was primarily Caucasian, age 50 and older, it is suggested that before the Broome PMSES is used in clinical studies, additional research to evaluate the technical and psychometric properties of the Broome PMSES in other samples be conducted.

Suggested areas of additional psychometric evaluation of the Broome PMSES include:

1. Large samples of minority women age 50 and older with UI.
2. Women age 49 and younger with emphasis on samples of Caucasians and large samples of minority women.
3. Women who have not been treated for UI by a health care professional.
4. Validity studies of larger clinic samples using a known groups comparison.
5. The incontinent homebound, age 50 and older.
6. The incontinent homebound, age 49 and younger.
7. Men who are incontinent following prostate surgery.

Research and validity of any scale is an ongoing process. Continued reliability and validity analysis of the Broome PMSES will add to the body of knowledge in providing care for persons with urinary incontinence.

**References**


